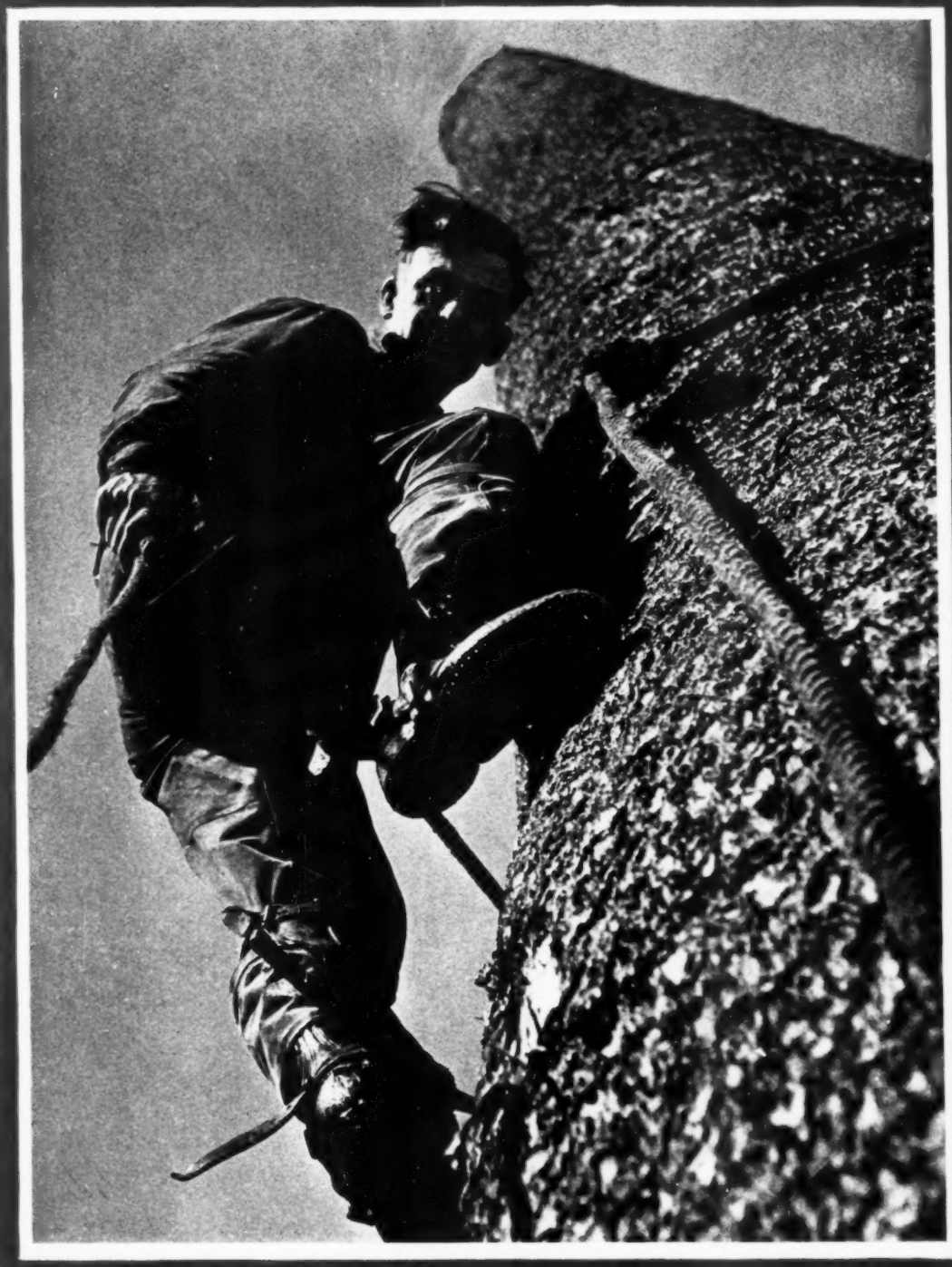
AMERICAN FORESTS



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AMERICAN FORESTS

VOLUME 49 NOVEMBER, 1943 NUMBER 11

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OVID BUTLER

Associate Editors
LILIAN CROMELIN ERLE KAUFFMAN

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The American Forestry Association, founded in 1875, is a citizens' organization for the advancement of intelligent management and use of the country's forests and related resources of soil, water, wildlife and outdoor recreation.

Its educational activities seek to bring about a better appreciation and handling of these resources, whether publicly or privately owned, that they may contribute permanently to the welfare of the nation and its people.

In addition to publication of its magazine—AMERICAN FORESTS—designed to keep before the people of the country important conservation questions and issues, the Association carries on educational work in various fields including forest fire prevention, reforestation, protection of wildlife, prevention of soil erosion, preservation of wilderness areas, establishment of national forests and parks, advancement of forestry by private endeavor, the teaching of conservation in schools and the promotion of research in timber growing and forest utilization.

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The Forest Exchange

Can You Help These Kids?

SIR: I am teaching in a nursery-kindergarten where wooden toys are favorites. Recently I tried to buy odds and ends of plywood to make blocks (hollow) and cut-out animals and wooden dolls, but was unsuccessful.

I wrote to several mills around here and asked them if they would please donate scrap to this institution, the Chicago Nursery and Half-Orphan Asylum. I never even received an answer. Can you give me names and addresses of places where we can get odds and ends of lumber? Is there something similar to plywood that is obtainable? — *Mrs. Norma Zuehlke*, 2801 Foster Avenue, Chicago, Illinois.

Here's Real Horse Sense

SIR: Barney Helmick, old-time ranger on the Black Hills National Forest, has been conducting a vigorous fire prevention educational campaign. "Crush out your smoke, break your burned match, drown your campfire" Barney has been telling lumberjacks, ranchers, and the townspeople who come out for a weekend picnic.

After receiving a report from woodsman Alfred Erickson that Jake, his faithful old skid-horse, had discovered a small forest fire, Ranger Helmick is beginning to think that his efforts have been worthwhile.

"I was returning home from a day's work in the woods, driving Jake ahead of me" Erickson told Ranger Helmick, "Jake stopped suddenly and looked down at the side of the road. I thought he had seen a rattlesnake. Instead it was a small smoldering fire. Several neighbors came along and we carried water in our hats from a nearby stream until the fire was extinguished."

Jake showed far more horse sense than the careless smoker who had flipped a cigarette from his car and started the fire.—*Fred Johnson*, Denver, Colorado.

It's an Idea Worth Trying

SIR: After reading John Clark Hunt's very interesting article "Fire-Fighting After the War," in your October issue, I could not help but wonder why no reference was made to the use of barrage balloons for detecting forest fires. Perhaps this has been tried out and found not to be feasible, but if this is not the case, it seems to me that they are made to order for the fire lookout's job. When the war is over there should be enough of these balloons available to give our forest areas good protection. This should be particularly true in the South and East where the forests are relatively flat, and where the vision of a man in an ordinary ninety-foot lookout is restricted. Even in rugged country, such as the Rockies, the barrage balloon strikes me as having it all over the mountain-top lookout. Has anything been done about this?—*John T. Warder*, Kansas City, Missouri.

Argument for Natural Rubber

SIR: I am afraid that I do not follow the reasoning in the editorial ("Tomorrow's Rubber?" Editor's Log for August), which compares the investment required to produce raw rubber on plantations with that required for synthetic production. In the first place, large plantations have had a productive capacity almost twice the figure that you have used. Estimates for plantations in Central America will be much higher than your figure.

The major flaw in your reasoning is that the synthetic factories need to start with a raw material that has already taken man-hours and land to produce. If these man-hours and the investment in the very fertile land that will grow corn are included in the total investment required to produce rubber by synthetic means, your results will be quite different. Plantation rubber needs no raw material other than a fertile soil, plenty of rain, sun and carbon dioxide.

Another consideration to offset the necessity that we wait for five years to start production is that the Hevea plantation, once planted, has a life of twenty, twenty-five, or more years without replanting. You cannot claim so much from your corn that is to be used as a raw material for synthetic rubber.

Another item may interest you. The 90,000 men who will be required to plant 270,000 acres of rubber will need houses. It has been at times more feasible to build houses in such quantities with lumber imported from the U.S.A. than it has to use locally exploited timber. I am sure that your forestry industry will not be adverse to having this business, instead of that of the 1,250 workers in the synthetic factories.

I make these suggestions not in a critical tone, but as reminders that the problem of synthetic versus natural rubber is more complex than the editorial indicated.—*Walter Bingham*, The Goodyear Rubber Plantations Company, San Jose, Costa Rica.

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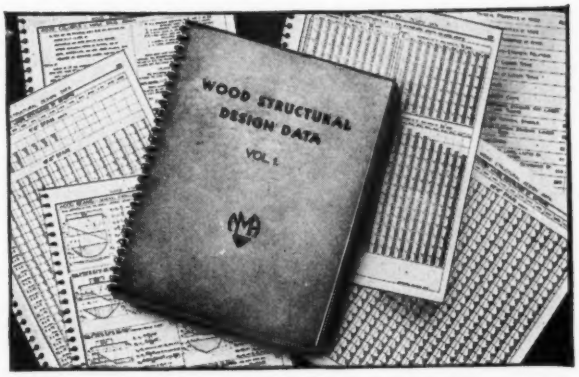

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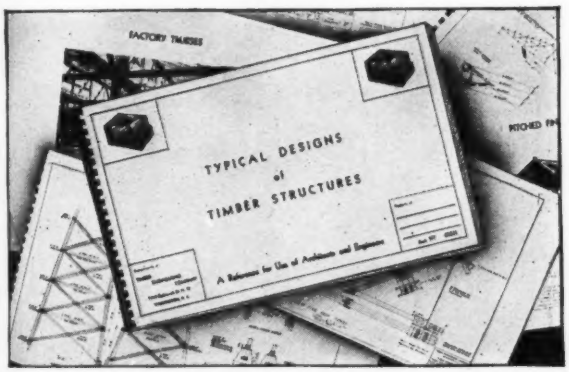

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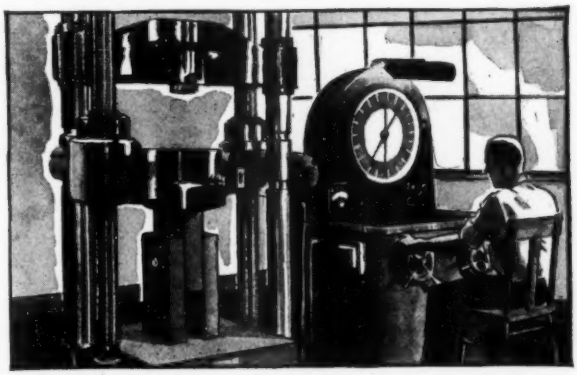

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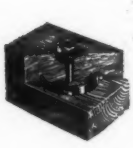

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THE EDITOR'S LOG

Why Wood Shortages?

Scarcities in lumber, pulpwood and fuelwood are very real, as anyone who lately has attempted to obtain these products of the forest well knows. Not so apparent, however, are the reasons why. We know in a general way that we can't have lumber and many paper products because lumber and pulpwood are critical war materials. We don't fight with fuelwood, but we understand vaguely that woodsmen haven't the time to cut it. Beyond that we are not sure.

Neither, it seems, is Congress. Alarmed over increasing scarcities, and particularly a decline in lumber and pulpwood production, two congressional committees are investigating the situation. The Patman Committee on small business in relation to the war effort is dealing with lumber, a subcommittee of the House Interstate and Foreign Commerce Committee is looking into the pulpwood situation.

Meanwhile, out in the woods the United States Forest Service and the Lumber Division of the War Production Board are working jointly with a million dollars supplied by Congress to speed up logging and mill operations. The Pulpwood Division of the WPB is working with the paper and pulp industry to improve pulpwood production. The Forest Service, the Extension Service and the state forestry departments are struggling with the fuelwood situation.

The congressional committees and all of these agencies concur on one point. Lack of manpower is the chief obstacle to increased production. This is crystal clear. Men are urgently needed to cut sawlogs, to cut pulpwood, to cut fuelwood. There are other minor bottlenecks, to be sure, but solution of these would in no sense improve the situation unless the labor shortage is first overcome. What are the chances here? Unfortunately, not too good. Neither of the congressional committees, after listening to expert testimony, appears to be optimistic on this score.

While not offered as an easy solution to the problems troubling the experts, it does seem that the government's multiple campaigns are largely separate attempts to increase production of the same raw material, and that all are seeking the same kind of labor to do so. With a limited labor supply there is almost certain to develop competition for that supply. Echoes of this competition crept into some of the congressional hearings. Who is to decide, for instance, whether a man is to cut sawlogs, pulpwood, or some other forest product? Who is prepared to state what forest product is the most critical?

Foresters have a highbrow term, *integrated utilization*. It means simply that those trees or parts of trees suitable for sawlogs, pulpwood and so on should be put to those uses rather than attempting to produce the maximum of any one product. Attempting the latter always results in waste of labor and material.

What assurance has the public that the best pulpwood trees will reach the pulp mills, the best sawlogs the sawmills and only those trees or parts of trees suited for fuel will reach the woodpile? We have no specific suggestions as to how integrated utilization of labor and forest raw material can be worked out to best facilitate the war effort, but the problem is there.

Heroes with Axes

The valor and endurance of the men who fly Britain's fast all-wood Mosquito bombers over targets in Germany have become tradition.

Yet little has been said of the men who, thousands of miles away from the sound of exploding bombs, make these lightning aerial thrusts at the enemy possible—the men who get out the gargantuan Sitka spruce from which the Mosquitos are made. The reason for this no doubt is that these heroes with axes are so far removed from the "news front" that even those who write the official communiques are not fully aware, except for production reports, of what is going on.

It is therefore revealing to read what Clark Dargavel in "Canada's Wartime Timber Problems," on page 518 of this issue, has to say about the lumberjack army on Queen Charlotte Islands, fifty miles out in the Pacific. Quoting an observer who recently spent four weeks in these isolated spruce forests, author Dargavel brings out the amazing fact that so gruelling is the task assigned these men that "they wind up each day in a state of physical exhaustion—and exhaustion so complete and unnerving that the logging boss sends them home every three months for a complete rest." That these axmen for the most part are former wrestlers, longshoremen and local "tough guys" gives accent to the rigors of their job.

There are 900 men on the islands, working on "piece work," and the faster and longer they chop the more spruce they deliver—the more dollars they collect. So they swing their six-pound axes at an unbelievable rate, felling nine trees, maybe fifteen, a day.

If this doesn't sound impressive, here, in the words of a competent observer, is a blow-by-blow description of the felling of a single giant:

"I'm watching Ollie Brackoos, Norwegian pygmy, 150 pounds of human horsepower, and Jack Cross, ex-wrestler, 225 pounds and standing six feet even. It looks lop-sided, but they're a champion team. Every muscle ripples through their backs, a beautiful thing to watch, as they chop, chop, chop in perfect rhythm. They do this non-stop for twenty-two minutes. Another five minutes and their necks turn red, then their backs. When their arteries stand out so that you can see blood pulsing through them, they stop for two minutes.

"They're off again, this time for twenty-six minutes—and really putting out. They're chopping so fast that four-inch chips rain down, covering the ground beneath. After a solid hour of this they've made a smooth undercut—but it isn't big enough. Another hour of chopping.

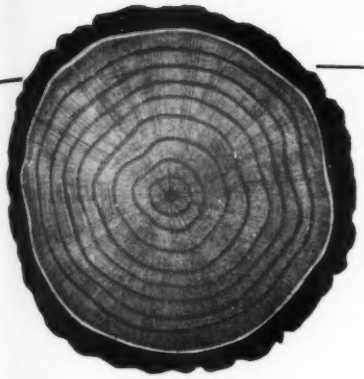
"Then they move over to the back of the tree and start all over again—this time with an eighteen-pound saw. Now it is back and forth, back and forth. For twenty-seven minutes they saw non-stop—and they've got to keep on going. It's cruel to see men torture themselves like this."

These are the men who are getting out Canada's spruce. They don't hear much about the planes it builds or the bomb loads they carry. Radio static is bad on Queen Charlotte—and boats call but twice a month.

Wild Game Under the Nazis

Perhaps the comments on the ruthlessness of Nazi game management in the last issue of the Log were too severe. On May 13, an Austrian newspaper, the *Salzburger Landes-Zeitung*, reported the following:

"The gamekeeper, Rudolf Foger, employed in the Lechtal, allowed game to be killed beyond the stipulated quota. In addition he allowed guests to take away about 600 pounds



of game instead of delivering it to the public authorities. As the money was paid into the hunting fund, he derived no personal advantage. In view of this extenuating circumstance, the Innsbruck Special Court sentenced him to only two and a half years' penal servitude."

We leave it to the reader.

That not only Germany but at least one of her satellites is commercializing game on a large scale is indicated by the following item from the *Neues Wienen Tagblatt:* "As is well known, not only the Axis countries, but neutral states imported large quantities of game from Hungary last year. Meatless days have increased the demand; all catering establishments show great interest in venison and wild boar, and demands can only be partly met."

On the other hand, both game and predatory animals are apparently increasing in some parts of Europe where Germans are not numerous and the local population is not in a position to do much hunting. A Paris newspaper, *Le Petit Journal,* said on July 7, "In order to protect the potato crops from wild boars, agriculturists of Chaumont (a mountainous district of eastern France) have surrounded fields with electric wire."

Reports from Finland and Norway indicate a considerable increase in the number of wild beasts, particularly bears, wolverines, lynxes and wolves.

If the war should last a few years longer perhaps the wolves will again prowl about the outskirts of Paris as they did in the wars of Francois Villon's time.

Wartime Fire Prevention

If your mind runs to figures, here are some new ones. The United States Forest Service has announced that its Wartime Forest Fire Prevention Campaign has distributed more than 22,000,000 posters, cards and envelope stuffers during the current fire season. This is one piece of fire prevention literature for every six people in the country. Or if you would like them placed end to end, the faces of Hitler and Tojo, which adorn the posters, cards and stuffers with the reminder that "Our Carelessness is Their Secret Weapon," would line the Lincoln Highway from New York to San Francisco.

This distribution of fire prevention literature, however, is but part of the campaign. Radio programs, motion pictures, newspaper cartoons and newspaper and magazine advertisements have been broadly promoted. The extent of these activities is indicated by the announcement that nearly 700 newspapers published fire prevention advertisements this season. Outdoor advertising companies contributed 5,000 billboards.

According to R. F. Hammatt, director of the campaign, emphasis this year was placed on the need for greater public participation in forest fire prevention to help relieve the million man-hours tied up yearly fighting fire; to reduce actual and potential damage to critical war materials such as timber and feed for cattle and sheep; to protect watersheds vital to power and irrigation; and to eliminate fire danger to military establishments and war industries.

Public and private agencies have given unstintingly of their time and energy to this needed campaign. Certainly the people of the country, should they persist in carelessness that is responsible for more than 150,000 forest fires each year, cannot lay their destructive acts to ignorance.

Tree Farms

One hears much these days about "tree farms"—a term adopted by the lumber industry to extend and popularize forestry. The National Lumber Manufacturers Association defines a tree farm as "an area of land devoted to the continuous growth of merchantable forest products under consciously applied forest practices."

More important than the term is the concept behind it. The organized lumber industry is campaigning to expand the practice of forestry among timberland owners. The tree farm idea is an important phase of this expansion. To be qualified as a "tree farmer," a forest owner must assure his willingness to maintain designated land for the production of forest crops; must provide reasonable protection from fire, insects, disease and from damage by excessive grazing; and must harvest his timber in a manner that will assure future crops.

The tree farm movement is particularly advanced in the Pacific Northwest, where it originated, and where at the present time nearly 2,000,000 acres are so dedicated. The movement in the West is under the direction of the Joint Committee on Forest Conservation of the Pacific Northwest Loggers Association and the West Coast Lumbermen's Association. There are also separate tree farm movements among western and southern pine lumbermen.

A recent and noteworthy publication, *West Coast Tree Farms,* issued by this Joint Committee, illustrates how the lumber industry is expanding the practice of forestry on the basis of facts and figures as to profits from tree growing. Consider the following trenchant sentences: "Owners who dismiss the idea of timber growing by private enterprise as poppycock, without even appraising what their own properties will do, are likely to commit the grevious error of writing off a valuable capital asset from sheer ignorance. It has been done by timbermen before."

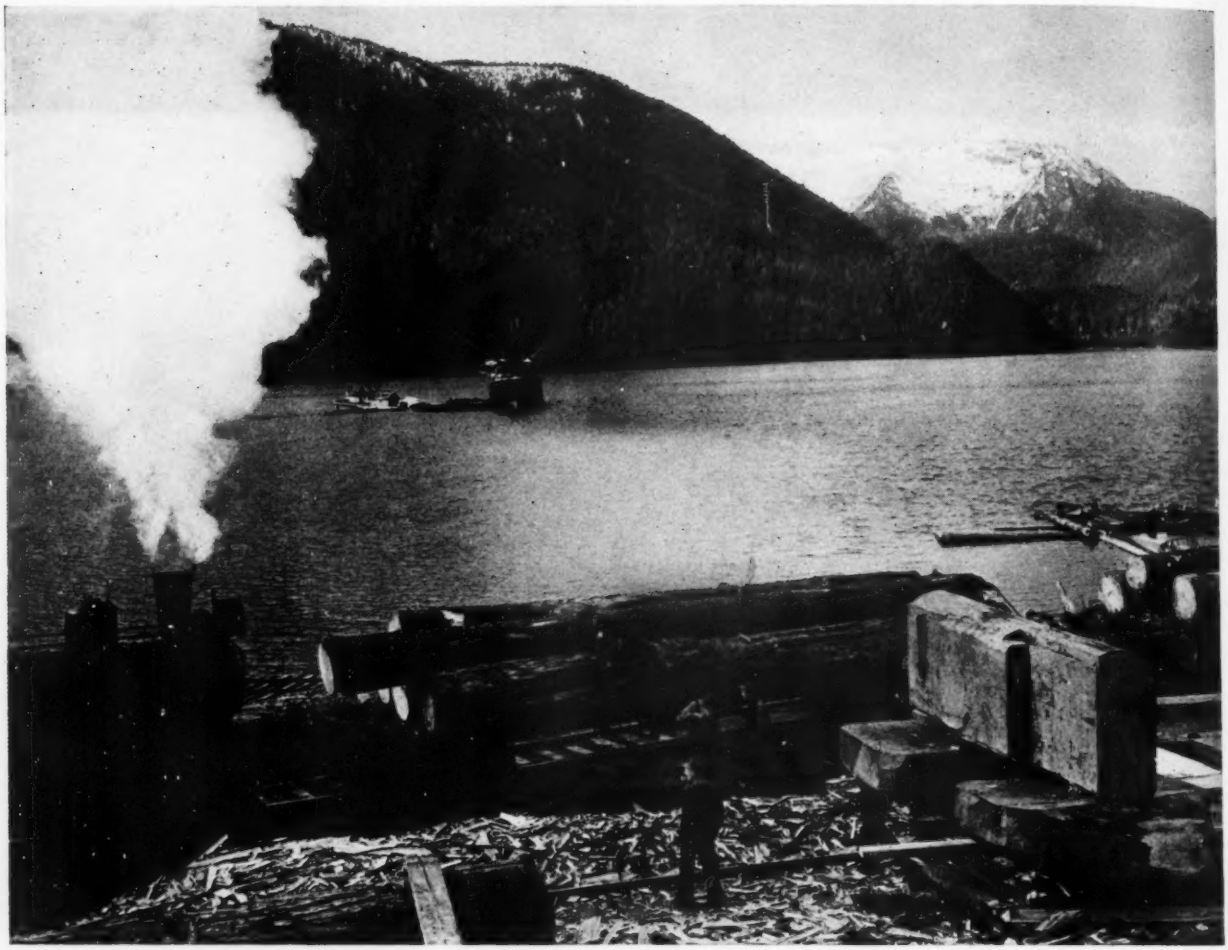
This is pretty straight talk. We hope tree farms multiply in number, area and volume of timber in all the forest regions.

Any Deerskins?

Uncle Sam needs your deerskins. In a joint statement issued by the War Production Board and the Fish and Wildlife Service of the Department of the Interior, deer hunters are urged to turn all hides into commercial channels for the manufacture of gloves and mukluks, or Arctic shoes, for our fighting men on fronts where the climate is frigid. The flow of foreign deerskins, which formerly came from many out-of-the-way ports, has virtually stopped.

So if you are lucky enough to have the time and the ammunition to stalk a buck this fall, don't forget the boys in Iceland and Alaska. They need their hands and feet right now for some very special hunting, and the hide of the deer you bring down will serve them—and you—much better as gloves and shoes than as a wall decoration, nicely mounted.

Ovid Butler



Essential civilian battlefront is the Sitka spruce-producing Queen Charlotte Islands

Canada's Wartime Timber Problems

By CLARK DARGAVEL

Canada's task of producing four billion feet of lumber this year is magnified by shortage of skilled labor

IN THIS war, wood is being used in more ways than any other single commodity. And Canada is supplying its share to the United Nations. Canadian forests are flying over Germany as airplane parts, rumbling over Russian steppes as armored vehicles, fighting in China as parts of Bren guns and blasting Italian ports as explosives.

One of the most essential civilian battle fronts in the world is in the Pacific Coast province of British Columbia, source of more than a third of Canada's logging output. So critical is this region that former loggers are being transferred from ship-building jobs back to the forest to bolster the war-diminished ranks of the lumberjacks.

Logging reports are the battle communiques from this front and in recent months the news has been bad. In 1940 and 1941 records cuts of lumber were made in British Columbia. But in 1942 production was down twenty percent and now lumbermen are talking about 1943's cut as twenty-five percent below last year's mark. One factor was the wet weather of last winter, the worst season for logging operations in a half century.

But the chief factor in reducing output is the shortage of labor, especially of skilled labor. Additional factors are serious difficulties in securing automotive equipment and other supplies, and the necessity of conserving rubber and gasoline have their inevitable effect on transportation of logs and lumber.

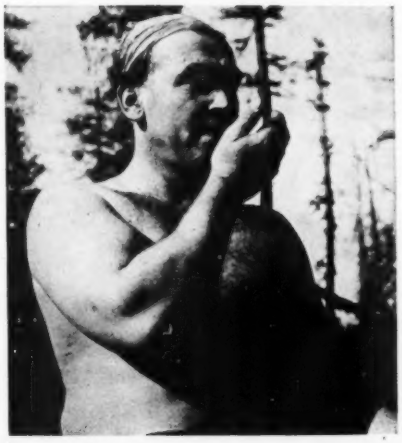
Toppers, fallers and other key men in big timber operations take about five years to train. Many have left the forests for the armed services, some to work on construction in Canada's far north, others into city munition plants. Typical logging crews used to consist of eight experienced men and two green hands. More often, now, there are two experienced hands and eight green men.

Selective Service offices have been channelling men back to the forests, but it is a difficult task to build up the present force of about 8,000 to the level of the 13,000 men who produced 1941's record cut. It is not a problem to be solved merely by pouring men into the forests, for loggers cutting down trees represent only one phase of the logging operations. Before they lay an ax to wood, railways have to be built, camps laid out, booming grounds created and enormous quantities of necessary equipment installed.

In 1940 Canadian lumbermen faced an unprecedented demand for lumber. Domestically, a suddenly-expanded building program for the armed forces called for huge supplies of timber, but Canada gave No. 1 priority to Britain's plea for lumber. Cut off from her former sources of supply, post-Dunkirk Britain was re-arming feverishly and needed every stick of lumber she could get. To meet this situation, British Columbia lumber operators had to concentrate their limited manpower on cutting. New truck roads or railways were not built, new equipment was not installed. This continued until 1942.

Today, even if thousands of new workers could be put into the industry, it would be like skilled workers entering a factory where the machinery had fallen into disrepair.

Canada, always an important lumber exporter, would not be facing the lumber famine problem her civilians are experiencing today if it were not for her good-ally policy. Britain and the other



It's gruelling work, but Canada's thin line of lumberjacks is getting out timber — one half of which will go to Britain and the United States

countries of the British Commonwealth of Nations will get about one-quarter of Canada's estimated production of four billion board feet of lumber. The United States will get another quarter of the total cut. In Canada most of the remaining two billion feet will go to direct or indirect war requirements. The amount to be used for essential civilian purposes is described by A. H. Williamson, timber controller, as "pitifully inadequate." Canada has been shipping out so much lumber that even military building programs have been delayed.

While recognizing that war's insatiable demands have been responsible for the shortage of lumber, that shortage of a hitherto abundant material has brought about a new attitude toward Canadian forests. Canadians always have taken their timber riches almost for granted, dipping with prodigal hands into forest capital built up over the ages. The war, by multiplying cutting several times, has brought into sharp focus a long-developing situation.

This has engendered in an ever-growing group of Canadians a determination that postwar years will bring to the nation's forests better logging practices, wider reforestation programs, and stern drives to cut waste from fire and disease. Dr. R. C. Wallace, principal of Queen's University and vice-chairman of Canada's government-named reconstruction committee, declares there is more interest in conservation work in Canada today than there has been in thirty years.

"We have to a considerable measure neglected our resources as cropable assets and that applies more particularly to forestry," he said recently. "A great deal of work has to be done in our forests in order to put forestry and our forests on a sound basis."

The first need is for information. "We have an extraordinarily inadequate knowledge of the situation," he said, revealing that a considerable amount of survey work is now going on.

Most of this survey work will be done from the air. After the war there will be enough airmen to survey Canada's 1,220,000 square miles of forest land. They will use in this work a Canadian-invented device, the duoscope. From aerial photographs, using this device, the volume and kind of wood in any given area can be calculated.

Research work by the National Research Council and the Dominion forestry service, although curtailed by the war, has disclosed better practices in reforestation, disease and pest control, and even fire protection.

In British Columbia, the provincial government is taking an ever-growing interest in its forests, rating it the province's most important single problem. Already it is doing considerable survey work, employing men released from the armed forces. There is increased reforestation work under way there. Also, there is talk of a new lumbering technique, using five-man portable mills to cut the trees that big operators term "small stuff." This is being advocated as a means of reducing forest fire dangers as well as providing a considerable volume of rough-cut lumber to be trucked right to the site of construction work.

British Columbia is taking the lead but throughout Canada there is a rising interest in the future of the country's $500,000,000-a-year forest industry. When the war ends, "we must do a great deal more for our forests from the public standpoint than we have done," Dr. Wallace recently told a gathering of provincial and federal leaders and experts in Ottawa.

He said the Dominion's reconstruction committee "will recommend to the government that we take our forests very seriously and be willing to spend money on them in considerable amount in order that they be maintained as one of our great fundamental resources, as they are not being maintained at the present time."

There is more to the situation than the straight dollars and cents of a single industry, even though it is the third richest one in Canada. As the forests vanish so will tourists diminish. The familiar painful pattern has developed in section after section of Canada. When forests vanish rivers that were summer-long trout streams have the uncomfortable habit of developing big spring floods and dwindling to trickling brooks in summer. Soil erosion problems develop, game and fish disappear.

Vastness of the problem is obvious when experts say fully one-third of Canada's area could be best used for growing trees. The bright side of the picture is Canada's present awareness of the problem and initial preparations being made to cure this headace-in-the-making.

Meanwhile, the home front's war job of getting out the big timber goes on. A recent report from Queen Charlotte Islands, in the Pacific Ocean fifty miles from the Canadian border, and only a day's flight from war-torn Kiska, graphically illustrates how gruelling this task may be. The report is from a director making a pictorial record of the giant Sitka spruce operations.

"There are 900 men on these islands," he writes, "surely the toughest guys in the world, cutting gargantuan spruce trees for airplane production—mostly to make Mosquito planes, often called the world's fastest bomber. Their job rates four stars for 'War Effort' and ten thousand stars for suffering in silence. What these men go through each day to wind up in a state of physical exhaustion—and exhaustion so complete and unnerving that the logging boss sends them home every three months for a complete rest—is something to write home about.

"Most of these men are former wrestlers, boxers and the local 'tough guys.' Many are seamen, longshoremen and the type of men who are rough, plenty rough outside, but up here soft spoken and kind, but not gentle. Some are physical brutes like Tony Varga, Hungarian, six feet, eight inches tall, and weighing 247 pounds. Some are small like Ollie Brackoos, Norwegian, 150 pounds of human horsepower. Most are Norwegians, Swedes, Frenchmen and a few Indians, all living in a world so far apart from us that they ask 'What made you come all the way up here to make pictures? Hell — we ain't that important.' "

To this, the men who fight with wood on the battle fronts will quickly disagree.

WHEN THE TALLEST LADS ARE GONE

Comes the darkness, comes the dawn
Out of depths beyond our knowing,
And the lads that now are gone
Only yesterday were growing;

Growing tall and straight and trim,
Like a poplar we discover
When the sunlight lifts a limb
From the greener woodland cover.

Comes the darkness, comes the dawn . . .
We are little, God, and narrow,
But there's light that leads us on
When there's One who marks a sparrow.

Oh, there's light that leads us on
And there's dew on rose and yarrow
When the tallest lads are gone,—
And there's One who marks a sparrow.

LEIGH HANES.

Reprinted from *The Lyric.*

DUCKTOWN—A POSTWAR CHALLENGE

Can Man Correct a Century of Land Abuse in Tennessee's Copper Basin? A Start Has Been Made

By KENNETH J. SEIGWORTH

The Copper Basin of southeastern Tennessee, long known as the Ducktown Mining District, is a classic of forest and soil destruction. Scientific reports have discussed it in measured and dignified terms. Conservationists have expressed indignation over the tremendous loss of natural resources. The devastation began nearly a century ago with the discovery of copper. There was overcutting of timber to provide fuel for smelting. The ore roasting gave off deadly sulphur fumes which destroyed much of the remaining vegetation. Forest and grass fires were common. Many individuals and numerous corporations—local citizens as well as Wall Street capitalists—participated in the region's exploitation.

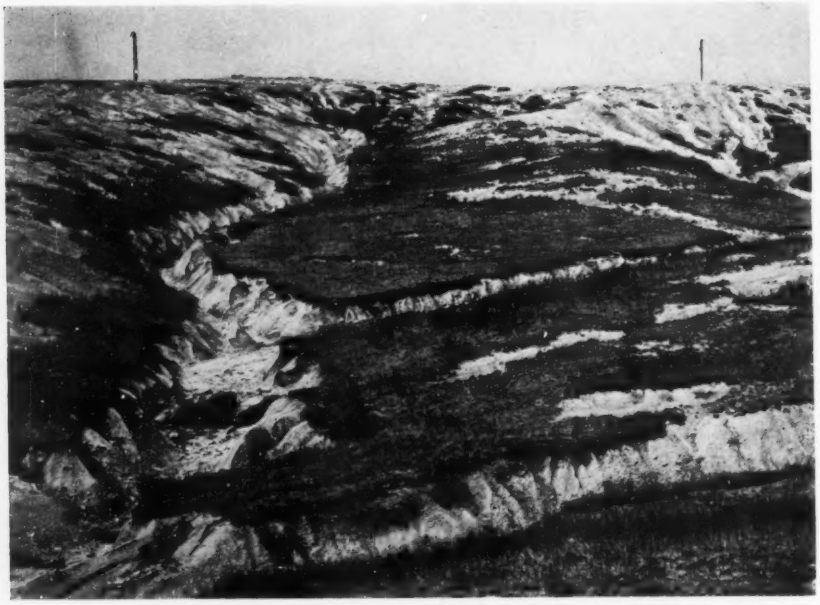
About thirty-five years ago a developing market for sulphuric acid enabled the mining companies to utilize the sulphur fumes for acid manufacture. This removed the major destructive agent, but it did not stop soil erosion. Nature, unaided, has been unable to repair the damage. In recent years the Tennessee Copper Company, the only remaining mining operator in the Basin, aided by the Civilian Conservation Corps and the Tennessee Valley Authority, has undertaken experiments to stabilize the soil and to reclothe the raw, red hills in green. Any real corrective measures must await the war's end. Mr. Seigworth tells of these first steps—and of the magnitude of the problem they are designed to solve.—*Editor.*

AFTER a hundred years of punishment, unusual even in the annals of land abuse, there is little wonder that erosion in the Copper Basin of southeastern Tennessee, centering at Ducktown, has reached almost unbelievable proportions. This once productive, but now copper-red, gully-scarred area has suffered as have few areas anywhere else in the world.

The ax, deadly sulphur fumes from open smelting kilns, forest fires, cloudburst rains on unprotected slopes, alternate freezing and thawing, and grazing have all contributed to its devastation. The inevitable result has been accelerated loss of soil fertility and of the soil itself. Millions of tons of silt have washed into Brushy and Potato Creeks and moved on into the Ocoee River.

For years, the rate of soil loss and the acreage involved have staggered many and challenged a few. The challenge was accepted by the Tennessee Valley Authority, the Civilian Conservation Corps, and the Tennessee Copper Company in 1941. The establishment of a TVA-CCC camp in the area pro-

Near Ducktown, Tennessee, lie 7,000 acres of raw red, deeply-eroded soil barren of plant life. Sulphur fumes from a copper smelter killed the original growth



Away from the center of complete devastation is a zone of grass islands separated by erosion gullies

vided a significant labor force for initial attack. Upon the recommendation of General Manager J. N. Houser, the Tennessee Copper Company, owner of some 21,000 of the devastated acres, agreed to contribute liberally in controlling erosion and in restoring useful vegetation. Technical planning and inspection and forest planting stock were provided by the TVA.

The name Copper Basin is indeed apt. The deposits of copper ore are extensive and have been worked since 1847. The exposed soil is generally of a copper hue. The topography impresses the observer as a great natural basin with the Ocoee River flowing across one corner. The total area of the Basin is about 60,000 acres.

Within the Basin there are four distinct zones of vegetation. Covering the surrounding mountain slopes is a fair-to-good Southern Appalachian forest. Then comes a transition zone of about 20,000 acres in which the tree cover becomes more sparse as one travels toward the center. The species change from oak, pine, tulip, birch and hickory to sassafras, red maple, sourwood and post oak. There is more and more sedge grass, green briar and weeds.

Finally, only an occasional scrubby post oak remains, and one is in the 12,000-acre sedge grass zone. On the outer edge of this zone the ground cover is generally good. There is little observable sheet erosion, and one sees only an occasional gully. Quickly, as one continues toward the center, the ground cover thins. Grass appears less vigorous. Erosion is obvious. The gullies are more frequent and deeper. Suddenly, the grass appears as small islands in a sea of devastation. Then barrenness—raw, red barrenness—stretching over 7,000 acres.

This is the Copper Basin. It has a weird, desert-like beauty. The center of its destruction is at Ducktown.

It is interesting to note that this section of southeastern Tennessee was acquired from the Cherokees, probably by the treaty of May 23, 1836. Title, apparently, was transferred to the State of Tennessee. Settlement appears to have been slow. Travel into the Basin was difficult; high mountains isolated it, and the soil probably was not as productive as that further west in the great Valley of the Tennessee.

All of eastern Tennessee was being vigorously prospected for gold, and in 1843 a prospector named Lemmons discovered metallic minerals in the Basin. His discovery was not followed up until 1847 when an operator named Weaver obtained a lease to exploit the property, later known as the Burra Burra lode. Records obtained by the U. S. Geological Survey indicate that some fifteen tons of ore were shipped to the Revere Smelting Works in Boston, Massachusetts. The operations appear to have been uneconomic and were suspended.

In 1850, John Caldwell began mining the Old Tennessee lode. He hauled his ore by wagon fifty miles to the railroad at Dalton, Georgia. Three years later a wagon road was built from the village of Ducktown, along the Ocoee River, to the railroad at Cleveland, Tennessee.

Vigorous development followed the completion of this road. Between 1850 and 1854, fourteen mines were opened. Over 7,200 tons of ore were produced by September, 1855. Transporting crude ore fifty miles by wagon was too expensive, however, and in 1854, one of the operators erected a crude smelter near the mine. By 1859 there were five.

Several interests combined in 1858 to form the Union Consolidated Company, which controlled 2,575 acres in the Basin. About the same time, a refining works, rolling mill, and wire works were

Still farther away a few trees have a foothold, mostly worthless species such as post oak, sourwood and sassafras

constructed at Cleveland.

Uncertainty during the Civil War seems to have caused a virtual cessation of mining operations. After 1866, development of the Basin was rapid for several years. The quality of ore became poorer and prices dropped. The wood supply for charcoal, needed for local smelting, was being exhausted. During the period from 1879 to 1890, all mines were idle.

Completion of a railroad through Ducktown in 1891 enabled shipment of coke and other supplies into the Basin at lower cost. Later, when discoveries elsewhere showed that copper ore could be treated economically in blast furnaces, the larger operators instituted the blast furnace process. The Tennessee Copper Company, organized in 1899, soon became dominant. By 1937 it was the owner of some 21,000 acres and the only operator in the Basin.

Concentrations of sulphur dioxide gas injure plants directly through damage to the breathing pores and through combination with atmospheric moisture to form sulphuric acid, which burns the foliage. However, operations during the period from 1855 to 1878 were on a relatively small scale and apparently principal damage to the timber was caused by overcutting.

With the resumption of mining activity in 1891, "heap roasting" began in a large way. In this process alternate layers of wood and ore were built into heaps, or crude kilns, similar to the farm lime-kiln. Several roasting yards were established, and the destructive sulphur gases rolled off in great clouds. Remaining vegetation in the vicinity of the roasting yards was killed. At the same time, demand for fuel increased tremendously, and all of the timber within hauling distance was cut.

When, around 1902, the smeltng method was changed to blast furnaces, equipped with stacks, the gas was turned loose at higher elevations. Thus, the concentration of the sulphur dioxide was reduced, but it was spread over a much wider area.

During the period of open ore roasting, discoloration of plants occurred over a wide area and close observation disclosed serious damage, especially to trees, and numerous suits were brought against the copper companies. Litigation finally culminated about 1907 in the Supreme Court of the United States through action by the Attorney General of Georgia. The copper companies were warned that they must control the sulphur fumes or be enjoined from operating. One year's time was granted.

By 1907 large quantities of sulphuric acid were being used in various industrial processes, and especially in the treatment of phosphate rock in the manufacture of superphosphate fertilizer. Within the year the companies completed plants which recovered the sulphur dioxide gas in the form of sulphuric acid. It is interesting and fortunate that the formerly injurious gas is now harnessed for the production of sulphuric acid, which is used in the manufacture of essential phosphate fertilizer for the defense of our soil—and for munitions for the defense of the nation. The soil of one area was sacrificed—it is hoped temporarily—to maintain and build up soil fertility in a very much greater area.

Testing seeds of various grasses and trees to determine what will grow best on the divided hillsides

Undoubtedly, forest and grass fires were frequent. The woodcutter's ax and the discharge of poisonous fumes were both accelerated as industry expanded. The soil became progressively less productive. That any plant life survived is a miracle.

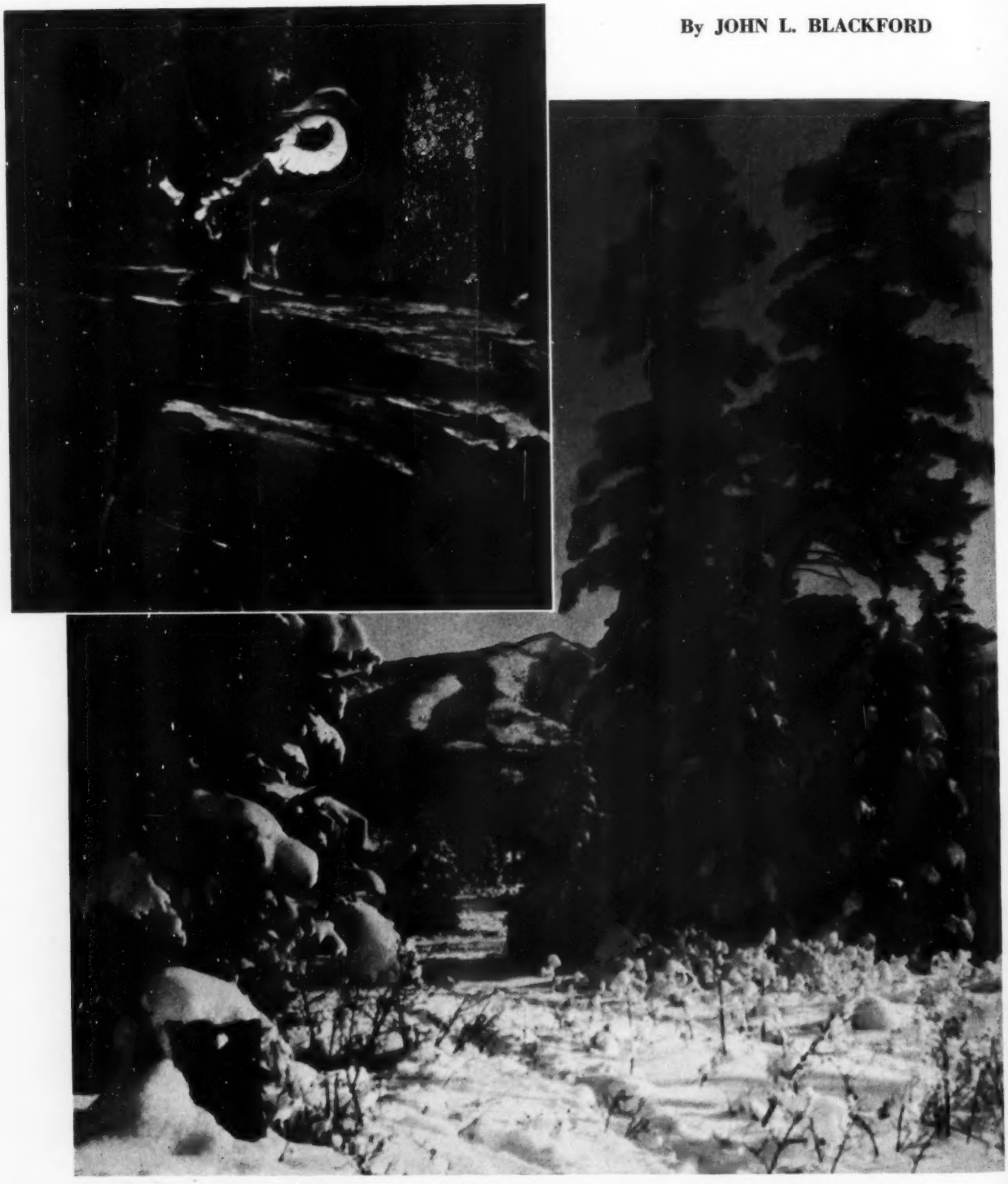
It is probable that significant interest in protecting the vegetation developed

(*Turn to page* 558)

Some trees will grow in the eroded soils. This is a twelve-year-old loblolly pine plantation

BIRDS THAT FOLLOW THE FIRS

By JOHN L. BLACKFORD



Winter in the Rockies of Montana. Stalwart firs close their ranks darkly where the wilderness begins, and within the woods (insert) a cock Blue, or Richardson's Grouse, largest of the woods clan, struts on his drumming log in characteristic courtship display

Veritable Rivers of Avian Song Flood Through the Verdant Branches of the Friendly Evergreens — Mother-Trees of the Birds

IF THERE is a tree that shelters both foothill slope and rugged mountain shoulder, leans a cool shadow somewhere across every western highway, and closes its ranks darkly where the wilderness begins, it is Douglas fir. Birds know the abundance of this lusty conifer. Within its roughly pillared underwood and vast green canopy their pairs and flocks are countless.

In the widely varied habitat offered by this mother tree of the birds, the frisky mountain chickadee is preëminent. Audubon warblers, the chipping sparrow, robin, Rocky Mountain nuthatch, sparrow hawk and horned owl commonly claim this home. So do the juncos that love the hills—the Montana, pink-sided, gray-headed and Sierra. Few such forests but treasure the olive-back, an abundant thrush whose choiring mellows the evergreen evenings with golden song. And "a small flycatcher in tall firs, singing a series of three notes, may safely be recorded as Hammond's."

In the Southwest, from 7,000 to 9,000 feet elevation, Mexican crossbills plunder the cones of the high balsam belt. Red-backed juncos rustle its needled floor. Broad-tailed hummers glitter, creepers climb, and siskins streak through its redolent world. The passionate voices of solitaire and hermit thrush are heard here. Reveling among conifers of the Mogollon, Huachuca and adjoining ranges, the red-faced warblers swing from the pendulant branch tips, painted boldest dazzle-camouflaging. Wherever you go among the firs, bird life greets you in numbers.

Like a large pine cone is this female Franklin's Grouse

The secret of this popularity? Perhaps the fact that the Douglas tree is not a true fir, nor a spruce, pine, or hemlock, although it has been named for each of them, has something to do with it. The Douglas tree so aptly combines the qualities of many forest associates that it has won approval of woodsman, bird and four-footed guest alike. Lost in the wild, I should prefer the shelter of this kindly conifer to any other. Game and furbearers share its dense, wind-proof cloak. It opens the far-flung folds of its protecting mantle to the sun on high, south slopes. Its streams rush clear and cold, and run the summer long. In winter a lofty crown bears up the heavy snows, while underneath in close young thickets, are dry, resinous twigs. These things only begin the story, for "false hemlock," as it is sometimes called, is always true.

If we were to saddle our cayuses and ride trail along the Rockies, and from the Alaskan panhandle through the Cascades into the High Sierras, we should compass the range of this stalwart giant. Climbing from the moist, north flanks of round-shouldered foothills, up through the heavy timber of mid-levels to the steep, rocky, southern exposures of the mountains, we would trace its altitudinal span and mark its way of life.

A pyramidal crown is typical of young Douglas firs. Regularly tapered, ash-gray trunks spread wide boughs that festoon slender, pendant branchlets with unusual grace. Matured, a magnificent shaft lifts the ragged or flattened crest high into the forest's roof. Often, through the dense overstory of heavy stands, no more than three percent of light may pass to the fern level below. And here only avians that love dank, dark forest depths remain.

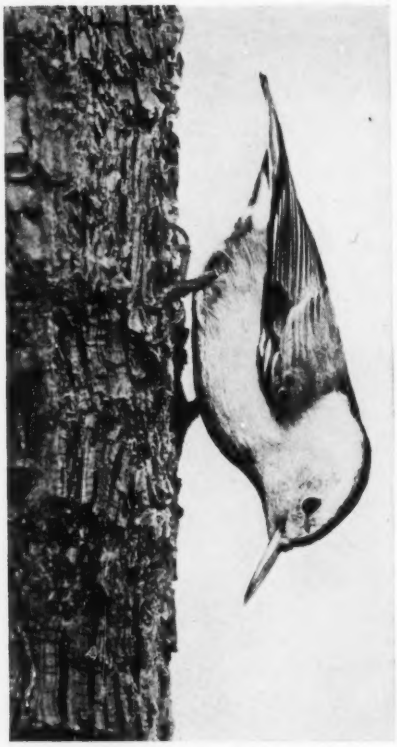
When the boundless empire of fir stirs in spring with the ecstatic breath of new life, a boisterous midget clamors in its depths with explosive joy and tumultuous harmony. A ruby-crowned king-

In this vast greenwood, the Western Robin makes his home

let's rousing shouts may ring half a mile away. Between melodic outbursts the mite flits restlessly from bough to bough, prospecting each needle cluster, or poising, hummingbird-like, before each drooping spray. Then a gleam from his ruby cap flashes fire like the jewel itself, and his astonishing carol exultantly assails our unbelieving ears. In seasons when scores of diminutive minstrels tour our way, veritable rivers of migrant song flood through the verdant branches of the friendly evergreens.

As kinglet's swelling chorus subsides, the swinging rythm of western tanagers breaks upon the lofty aisles of fir. The golden songster's cheerful lay is likely mistaken for the robin's; but an acquainted ear quickly selects his four or five energetic, sharp-edged phrases from among sustained, more inspirational outpourings of the rotund red-breast. A swooping sally at high level dispels all doubt, his gaudy chrome and crimson splashing brightly in midair.

Last summer I looped a Silver Doctor down from fir-crowned bank to the deep, rippling bend of a stream. Already one lashing trout had accomplished the trip from watery depths to my basket. Just as another rose and drove hard against the swift water to take my falling fly, a brilliant form ar-



A Rocky Mountain Nuthatch in familiar pose on the trunk of a fir

rowed down from the overhanging boughs. A reflexive jerk on the rod cheated the enterprising tanager. But the big trout had caught the swerving flash close overhead. He did not leap to my coaxing hook again. Perhaps I, too, should have felt cheated. Yet that surprising raid from the crowding firs, that blazing swirl of plumage in dazzling sunshine, was more than recompense.

To me, the olive-sided flycatcher, common to these forests, is a bird of the sunset hour. He is best at evening when a sinking sun burnishes the high ceiling of the forest, and great, gaunt spars thrust jaggedly up into the bronzy glow. Like lesser flycatcher kind, he chooses a prominent perch, strikes out to capture his passing dinner on the wing, and returns characteristically to his former station. Belonging to the upper terraces of the timber, a soaring spike or commanding top on fir-covered slope is his favored throne. From it he launches out a hundred yards or more into the sundown fire, and boldly returns on tireless pinions while nearer perches just as suitable are offered him. It is then that his perturbed *teer-teér, teer-teér* and rocketing *pi-pée* seem a proper timing of the speeding twilight hour, and his wide forays against the incandescent sky speak of the vast breadth of the wild, deepening now in the dusk and wrapping itself with night.

In both Transition and Canadian zones Douglas fir forms boundless, pure stands that safeguard the soil unusually well, yet admit a maximum moisture load. Snow accumulates to full depth in its many glades, and lingers late beneath the bordering shade. Denser timberlands hold their burden high upon a completer canopy, and keep from the ground below a greater portion of the winter fall. Nevertheless, the thirst of fir's soft duff and matted floor-cover is seldom quenched, though a sieve of old needles, decaying twigs and living thread roots doles the melt water but slowly into crystal creeks, regulating their flow.

To game birds, fir furnishes one of their deepest, safest strongholds. Ruffed grouse are abundant. Friendly Franklins range from the somber solitudes of spruce and cedar into its somewhat sunnier stands. The blue or dusky, America's largest woods grouse, must be sought in autumn at its upper altitudes, where the bird returns to winter on the needles of this provident tree.

As the patchy blanket of white recedes in spring the "hooting" of the dusky supplies firland's oddest sound. Less well known are the wing-flapping antics of the "grunting" grouse.

"One May," relates Winton Weydemeyer, whose photographs illustrate this article, "I decided to try for photographs of a blue grouse in full courtship display. About a dozen pairs were nesting on the fir-thicketed hills around my home in northwestern Montana. I thought this would be a simple matter as I had often watched their exhibition antics from short distances. But it wasn't. For seven evenings I stalked one particular cock before I secured a promising shot of him in a characteristic attitude—standing on a log, head erect, tail spread in a convex fan, neck showing two gleaming white rosettes with deep red centers. I snapped the shutter when the neck ruffs were most widely spread, during the first and loudest note of the grunting series, *Oop, oo-ooo-cutoo-cutoo.*

"As the time for the evening serenade was at hand, I sat quietly and listened. From afar came a single hoot, a deep-toned *Oop!* Again, and nearer to me, two birds answered. Then, about two rods away, a grouse leaped four feet into the air, beating his wings violently. Whirling at the top of his rise, he fell back with a second flapping, facing the opposite direction. He had barely touched the ground before a distant bird answered—then a third. During the next hour ten different birds, some half a mile away, joined in the exchange of hooting and wing-flapping. At one time, six cock grouse joined in a series of wing-flaps within the space of ten seconds."

Where fire has swept close stands of fir and pine, quaking aspen springs in haste from the pioneer carpet of fireflower, huckleberry, lupine and golden banner. In these grassy evergreen parks and sylph-like groves of the fir-aspen belt, Natalies's sapsucker is most at home. It was this happy chap, sporting scarlet tie and bright vest of lemon yellow, which, with his brown-barred mate, raised a dubious question in avian morals. For years, after each had been duly discovered, collected and named as separate species, the two consorted in unsanctified bliss. The dandy rapped out his amorous proposals from many a staccato limb. His jolly courtship dance was performed on a fir trunk for all to see. But not until the pair were spied jointly toiling for the same insistent brood was their partnership recognized and the incipient scandal cleared away.

In northern Arizona I found Natalie's sapsucker and the Kaibab squirrel leading personalities among the wildfolk of the famous Kaibab Plateau. The squirrel, a black and white, tuft-eared chatterer, was early intercepted hustling off with a part of my lunch. The sapsuckers were about camp jerking up the aspen boles that shone silver through evergreen down in a cool ravine. I'm sure they had a nest, but they are not inclined to "show you around" as their red-

The tiny Mountain Chickadee—always beautiful and always busy

naped kin will do. In late summer they escort fledgling families up into the deeper, unmixed firs to tap the resinous juice of the conifers, but this species does negligible harm.

Hairy woodpeckers and red-shafted flickers are stalwart citizens of the fir community The alpine and three-toes are year-round residents of its fathomless fastnesses. In northwestern Montana, when I look for the handsome Arctic three-toed woodpecker, I go first across cut-over firland or burn, and then to mixed broadleaf-conifer wood, where the scaly bark of western tamaracks is a second favorite of the yellow-crowned woodsman.

Throughout the West the dark blue uniform of Steller's jay announces the fir tree's constant guardian—provided the witty fellow doesn't give himself away by loudly defaming you from a distance. The tree's stair-like limbs make him a spiraled ladder; and from its upper rungs it becomes his duty to spy out anything amiss. At first alarm he glides down on set pinions to profit by the disorder. Even in the frozen silence of the January wilderness, when nothing seems to stir among the laden, white-bannered trees, he manages to conjure up a living. Clark's nutcracker resorts to the distinctive, three-bract cones of Douglas fir, but other seed-bearers, among them limber pine and piñon, are his favorites.

It was out from the dark, mysterious embrace of a rugged fir, just as the last chickadees lingered at my window feeding shelf one evening, that a pygmy owl launched his deadly, diminutive attack. All the desperate cold and clawing hunger of midwinter were told in his hurtling raid. My chickadees were keen to the dangers of the coming dark; but such a fateful moment could hardly pass without death for one, at least. Their small troop appeared to burst and vanish into the powdery blast sweeping the corner of the house. But the little marauder had pounced straight into the yellow square of light faintly carved from the creeping dusk by the glowing window frame. Unlike his prey, he did not know the treacherous transparency of glass. They flung themselves outward to safety. He struck against the unyielding pane. When I went out into the gusty growl of the rising northwind, I found the tiny, fearless warrior already whitened by the swirling flakes. His dauntless spirit must have returned to the firs, however, for sometimes I hear among them a "tinkling rondel" that at best is ghostly.

No primal timberland, except the vaulted naves of redwood, surpasses in magnificence the mighty "rain forests" of Douglas fir. In them, under a misty Pacific sun, the colossal conifer attains a dominance of ninety percent. Up from the twilit undercanopy, vast columns surge in bearded grandeur. Time is unmeasured here, human history begins only yesterday.

The secondary layer is typical Humid Transition. Vine and broadleaf maples, madroña and red alder umbrella the dank, luxuriant shrub stratum and rank ground growth. Salal, rhododendron, manzanita and sticky balm strangle one another. Ferns unfurl stupendous fronds or tapestry the furrowed trunks. A hundred feet aloft green usnea, Old Man's Beard, banners the midzone of the moss-forest.

Chestnut-backed chickadees, winter wrens and thumb-sized golden-crowned kinglets enliven these somber solitudes.

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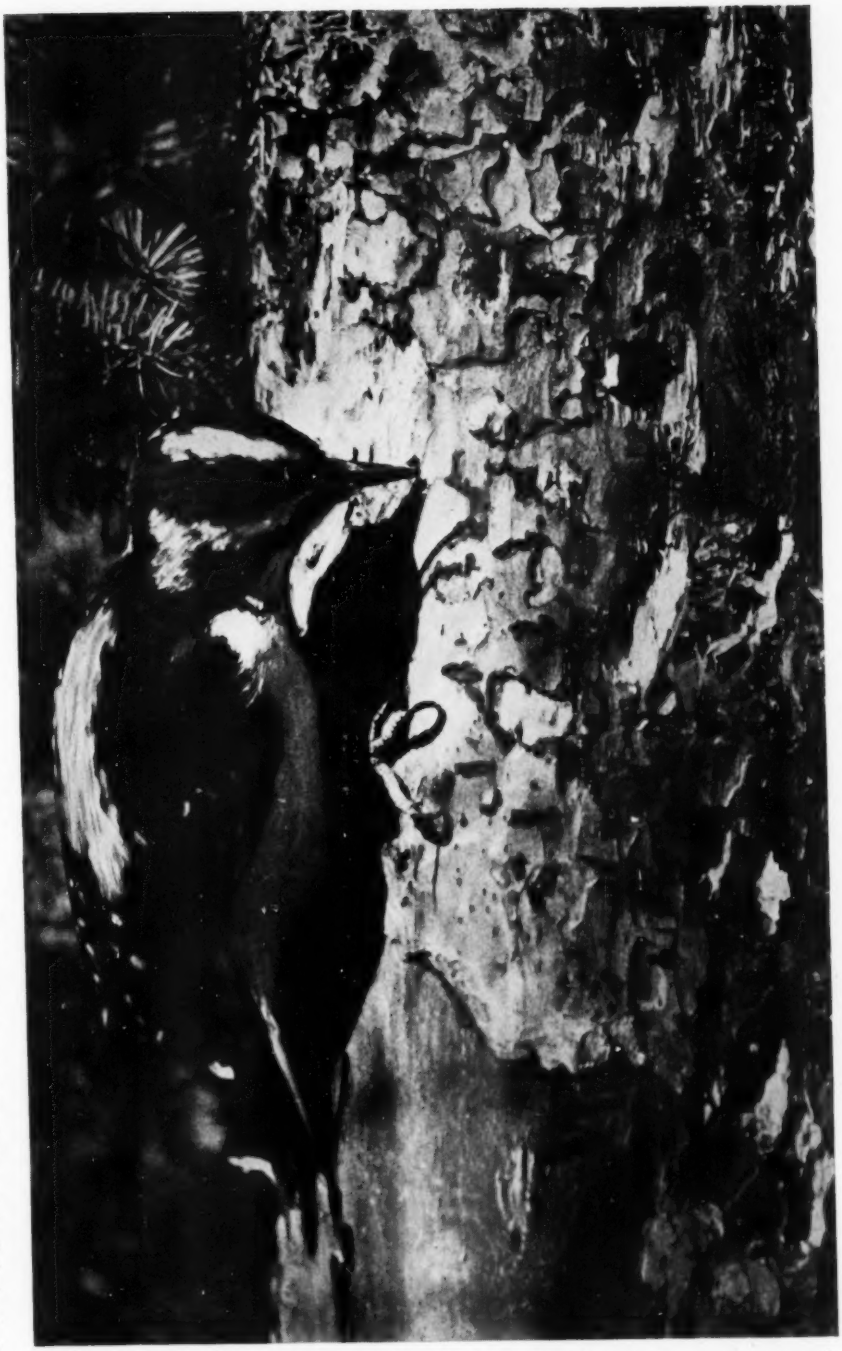


Strikingly marked, and strong, the Hairy Woodpecker — three-toed, yellow-crowned woodsman, clings to the scaly bark of a Western tamarack

COMEBACK OF THE FOREST . . .

THE comeback trail is always dramatic, particularly when it ends in success. This is true of human beings—and it is true of the forest. The formula for human recovery is often varied and complicated, involving at times great ingenuity and tremendous sacrifice. The comeback of the forest in the case of some species is relatively simple. The formula is seed supply, plus good soil, plus adequate protection from fire.

Among trees which have made good on the comeback trail is the white pine of the Northwest, known to the lumbering trade as Idaho white pine, and to the majority of ordinary citizens living within its range as the "silver" pine, because of the silvery gray of its bark. Though it ranges from British Columbia southward to California, it develops greatest size and highest economic importance in deep porous soils on gentle slopes and flats in northern Idaho and Montana.

Thus Idaho is the scene of the remarkable story told in pictures on these pages of the comeback of a western white pine forest. The series, covering a period of twelve years, was made on logged-over land, which was later burned, on the Cameron Creek drainage about six miles west of Elk River. The pictures were

Upper — logged in 1915, burned over in 1917, this is how the Elk River area appeared in 1931

Center — two years later, in 1933, the fast growing white pine begins to show above the underbrush

Lower — in 1937, after six years, the young forest of pine is much in evidence — a fine stand

The Formula is Seed Supply Plus Good Soil Plus Fire Protection — and Here is a Twelve-Year-Old Example . . .

made by the Bureau of Entomology and Plant Quarantine, of the United States Department of Agriculture, engaged in blister rust control work in the area. Each of the series was taken from approximately the same spot.

The area was logged in 1914 and 1915. Two years later, in 1917, it was swept by fire, the intensity of which may be determined from the dead, blackened snags. For a while, it was grazed annually by sheep. When the blister rust control crews visited the area in 1931, it appeared, as the first picture will indicate, rather barren, but wind-blown seed had germinated and in twelve years, as will be noted, the area has been transformed by nature into a fully stocked forest of white pine.

Nature has a great urge to grow trees and will renew the forest so long as seed sources are at hand, soil fertility is maintained and if repeated fires are prevented. Forest land that appears desolate and unproductive after logging operations generally will not remain that way if given half a chance to recover. Fires retard this recovery, may prevent it altogether if they occur frequently. Thus the formula, seed supply, plus good soil, plus fire protection, is pretty good insurance for the comeback of the forest.

Upper — as the new forest appeared in 1938 — with from 500 to 1,000 pine trees to an acre

Center — More forest and fewer fire-killed snags was the story in 1940 — ten years of growth

Lower — in 1942, after twelve years, many of the white pines have already reached "pole" size

LIVING WATERS FOR THE AGES

For Two Thousand Years the Irrigation Works of Li Bing, Chinese Engineer, Have Sustained the World's Densest Farm Population

By W. C. LOWDERMILK

IN OLD CATHAY, an ancient fable relates there once lived a boy named Alladin who had a wonderful lamp, which when rubbed performed miracles. Just recently, out in the same western province of Old China, I attended a ceremony commemorating a miracle not by Alladin, but by Li Bing and his son, Er Wang — a miracle in engineering which for 2,200 years has unfailingly provided irrigation waters and food for the vast Chengtu plain, where is maintained the most dense agricultural population in the world. Here, 6,000,000 Chinese support themselves on less than 500,000 acres, or an average of more than 2,000 to each square mile of soil.

I had come to Chungking at the invitation of Generalissimo Chiang Kai-shek to assist the people of China produce more food for their fighting millions and help make secure the soils of an old but constantly living land. So naturally, the idea of going to Chengtu, the capital city of Szechuan Province, had tremendous appeal, particularly as it was planned at a time when I could go into the mountains for the Li Bing celebration.

In the March issue, W. C. Lowdermilk, distinguished soil explorer and assistant chief of the Soil Conservation Service of the Department of Agriculture, told of his adventures and observations on a thrilling globe-circling journey to Chungking, where he had been invited by Generalissimo Chiang Kai-shek to assist in the development of soil conservation policies for China. Now, in another enlightening article, he brings to the readers of AMERICAN FORESTS the story of Li Bing, whose genius made it possible for six million Chinese to support themselves on a half million acres for more than two thousand years.—Editor.

Szechuan Province is called the "Garden Province" of China, and the Chengtu plain is the garden of the province. Every available spot is cultivated, as it has been continuously for 4,000 years. During my visit, fully a third of the landscape was blossoming rape seed, making great bands of gold amidst the rich green of heading wheat. There were spots of "pink" clover and the gray-green of broad-beans, all winter crops, to be harvested before rice is planted in May or June, for this plain produces two, three and sometimes four crops a year. Farm houses, with white plaster walls and tile roofs, were picturesque among waving bamboo, which is essential to the Chinese farmer in a thousand ways, from the sprouts eaten at his

The "inner canal" was cut through the toe of the mountain by Li Bing more than 2,000 years ago, securing to millions of Chinese the use of the life-giving waters of the Min River

table to the large stalks from which his farm implements and furniture are made.

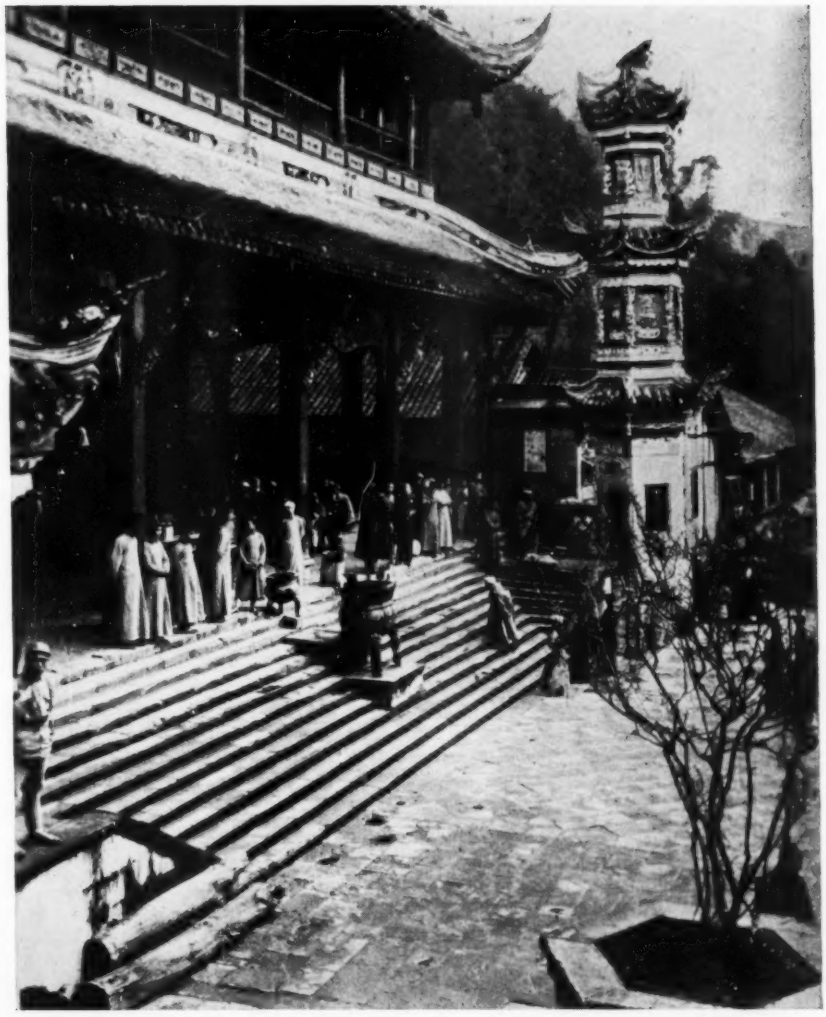
The plain was teeming with Chinese in bright blue garments. There were endless two-wheeled trucks and wheelbarrows, drawn or pushed by sturdy men and boys, straining at loads of coke, lumber, or foodstuffs enroute to Chengtu. An occasional automobile, with its raucus horn, sent pedestrians, donkeys and carts scurrying to the roadside for safety.

Twenty years ago there was not a wheeled vehicle, except wheelbarrows, in all this vast region. There was not a strip of road wide enough for an automobile. Today a great network of roads extends out to Burma, India and Russia. For this development, the Chinese have Dr. James Yard, a Methodist missionary, to thank. To show the millions of this interior province that in other lands there were things that could move faster than water buffalo, sedan chairs and wheelbarrows, he introduced a motorcycle — and with electrifying results. Satin-robed officials vied with each other to take their first ride on the bumper of this snorting machine. From this experience began the "good roads movement" in western China.

Graves were everywhere, and outside populous centers the countryside seemed to grow little else. For the land of China must support a double population and

The Six Characters—"Dredge Silt Deep, Build Spillways Low"—injunction of Li Bing, carven in stone, which has been followed with religious zeal through the centuries

supply food for the living as well as space for the host of ancestors who have passed on. Religion and custom demand proper burial, and graves are protected and worshipped and never intentionally destroyed. When interpreted in its results of expensive funerals and valuable lands appropriated to the dead, ancestor worship has been a heavy yoke which the Chinese have been compelled to bear. It makes dead men into gods who require space and reverence not accorded the living. This backward look helped produce the leaden conservatism from the shackles of which the new China is now extricating herself.



A huge, Buddha-like image of the father, Li Bing, stands on this —the principal altar of the beautiful Temple of Er Wang, the son—who completed the work his father initiated so long ago

These were some of my impressions and reflections as I journeyed to Chengtu. But with me at all times were the memory and genius of Li Bing, whose remarkable irrigation and engineering works have meant life to this vast region through hundreds of years. And to think of Li Bing is to realize the centuries of stability, intelligence and genius of our great ally, China.

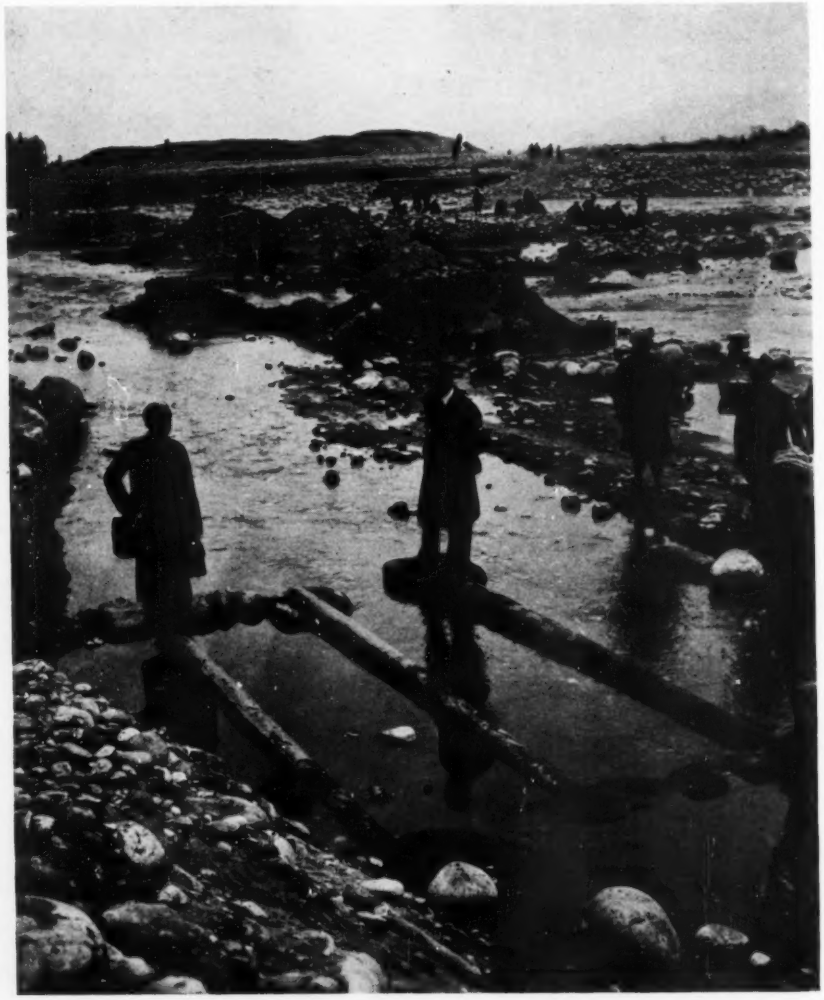
Long before our ancestors, wearing wild animal skins, had emerged from the forests of northern Europe, Li Bing had an intelligent understanding of hydraulics and engineering and had caught the waters of the Min River as they tumble out of the snow mountains of Tibet. He cut away the side of a mountain to divert water and interlaced the main channels with canals so that teeming millions for twenty-two centuries have never suffered a famine or a real flood. He did this in 250 B. C., as Governor of Szechuan Province in the Ching Dynasty, at the very beginning of the long period known as the Golden Age of China. Today, these works still provide one of the cheapest irrigation water supplies to be found anywhere in the world.

I was impressed with the simplicity of Li Bing's plan, which was completed by his son, Er Wang. But it was this simplicity which has kept it in operation these many centuries. Li Bing is the first engineer I know of whose problem was providing for stream bed load or debris, and who had the ingenuity to solve it. He utilized excavation and the simplest and least costly materials — wood, bamboo and stones picked out of the stream bed, which he built into uncemented but well designed structures to divert water as he chose. Then he prescribed a maintenance system on tablets of stone which has safeguarded the project for more than 2,000 years and which

would doubtless keep it in operation for another twenty centuries if modern engineers were not eager to utilize the wasted power possibilities and provide increased irrigation by a dam and water storage.

But these foreign-trained Chinese engineers are thus far up against an impenetrable wall of tradition, custom and religion. No official could hold his position if he flouted the farmer's opinion since concrete construction and modern engineering have developed has it been possible to improve upon the method prescribed by Li Bing and his son, Er Wang.

Shortly after my arrival, I was in the well-preserved and colorful temple to Li Bing, located on an island which was formed when he cut into the side of a mountain and built the inner canal to



Detail of the three ton-heavy iron bars which replace the "iron dragons" chained to the bottom of the inner canal by Li Bing—but lost ages ago—as a mark for excavation depth. The bar on the left was set in the Ming dynasty, the one in the center in the Ching dynasty, and the one on the right in 1924

and tampered with this old "Tu-Kiang" irrigation system. "Are not Li Bing's commands written into tablets of stone. They must not be changed lest the irrigation waters fail." One American-trained Chinese engineer who attempted to improve the system and divert some waste water to other lands, was hauled before the magistrate by the farmers and with difficulty saved his life. But only divert irrigation water. In the great hall, a huge image of Li Bing is fashioned like a Buddha, beautifully painted in gold and surrounded by rich draperies. Before this image stand two great figures, fully twelve feet high, one representing the civil authority, the other the military. Generation after generation of priests have kept incense burning perpetually before his altar. This is homage, indeed, to a benefactor. It was in this room, before a picture of Sun Yet Sen, the "Father of China," that I was asked to speak to the Conservancy Board and other officials on land-use with relation to the Li Bing project.

On a platform of Li Bing's temple, I looked up-stream until it was lost behind one of the ridges which rise higher and higher into the mysterious blue haze hiding the glaciers of the Snow Mountains of Tibet, 20,000 feet above sea level. On the nearer steep slopes, I could see many cultivated plots.

In the foreground, from my high elevation, I was able to examine with perspective these engineering works which have been in operation for so many centuries. The system is based purely on gravity flow, with no water storage, made possible by the year-round flow of the Min River—a minimum winter flow of 4500 second feet, and a maximum summer flow of 255,000 second feet.

Li Bing had the problem of diverting or dividing the flow of the Min into the area of the Chengtu plain, on the left of the main river channel. This he decided to do by digging a ninety-foot inner canal through the rocky toe of a mountain slope which came down to the river's edge, a tremendous and difficult task at a period when instruments were of the most primitive and men were the only machines available. To divert enough water for all times, it was necessary to take off more water than was needed, so a carefully-built spillway was provided to throw excess waters back into the main stream.

The next task was to divert the proper amount of river water from the outer main channel into the newly constructed inner canal. This Li Bing and his son accomplished by constructing a "fish snout," or a strong point, at the head of a big dyke of boulders. This diversion strong point is called the King Kong Dyke, and it is capable of withstanding flood waters. It is recorded that in 1280 a great castiron "turtle," weighing 21,000 pounds, was placed at the up-stream point of the dyke. Again, in 1922, two cast iron "bulls," weighing 93,000 pounds, were placed at the head to divide the waters. But these evidently sank long ago into the gravel fill of the stream channel. Only during the past decade has the "fish snout" been made of re-enforced concrete—the only concrete used thus far.

The "fish snout" is an important feature of the head works, for it divides the waters into two feeder canals. These, lower down, divide into nine canals which help distribute flood water and prevent damage. The nine canals are later divided into 526 laterals and 2,200 sub-laterals, providing irrigation water to an average depth of seven and a half

feet for the entire Chengtu plain.

At Kwan Shien, the river rushes out of the vast mountain mass lying between the Chengtu plain, at 2,000-feet elevation, and the Tibetan steppes, at an elevation of 12,000 feet, too swiftly to deposit silt and sands. Instead it dumps bed load materials of rocks and boulders. Li Bing recognized that these would quickly fill his diversion channel and throw the current out of the inner canal. He therefore prescribed for yearly excavation of this accumulated debris. It is reputed that he chained two huge iron "dragons" to the bottom of the stream bed at the depth to which excavation was necessary each year to maintain a constant flow of water. He had stone tablets carved with the injunction "Dredge Silt Deep, Build Spillways Low."

Having set up instructions, it was only necessary to see that they were kept year after year. This could be done better through religious means than any other, so temples were built and images of the benefactors enshrined within them. In short, Li Bing correctly diagnosed his problem and set up simple measures with materials at hand to do the job. Then he provided for their continuous performance through the medium of human religious instinct. Through this simple procedure, literally hundreds of millions of people during these twenty-two centuries have enjoyed security against famine and flood.

Thus it was with great respect to this ancient hydraulic engineer that I took part in the celebration of the annual dredging and repair work prescribed by him. Before this, I attended a meeting of officials and representatives of farmers from the fourteen counties of the Chengtu plain dependent on the waters of the Min River. Their discussions fell under four headings: Annual repair; special repair; repair on a grand scale; and emergency repair. Annual repair had to do with the "fish snout" and dyke repair and excavation of the inner and outer channels; special repair dealt with protection from floods, where work is done by the farmers themselves under direction of conservancy officials; repair on a grand scale had to do with the same kind of work but included projects of major size carried out every five years, according to tradition; and emergency repair, to be called for as needed, to stop breaks in canals or to reinforce weak points in dykes.

I witnessed such a summons in a local district out of Kuan Hsien. A ditch foreman, with a great brass gong, walked through the neighborhood beating out his call in heavy strokes. Farmers, hearing the signal, left their work and followed the foreman to the point of emergency repair.

With members of the Conservancy Board, I inspected the annual repair. As prescribed by Li Bing and tradition, the "fish snout" is repaired first. Then during the winter months, when the waters are frozen far back in the high mountains, the entire flow is diverted from the main channel into the inner canal by means of a temporary coffer dam made of bamboo sausages filled with boulders laid against tripods. Dredging and excavation of the main channel is accomplished by piling up boulders on the bank and on the King Kong dyke.

When this is completed, the coffer dam in the outer canal is broken, with appropriate ceremony, and another coffer dam is built from the "fish snout" across the inner canal. Thus, the entire flow is turned into the outer canal for forty-five days. During this time, farmers are required to clean out their ditches and make repairs. When we arrived, the inner canal was still alive with laborers, for it requires a great force to excavate boulders and gravel down to the iron "dragon."

The inner canal is excavated to a depth three and a quarter feet below the outer channel. This steeper slope draws a larger flow of water, estimated at sixty

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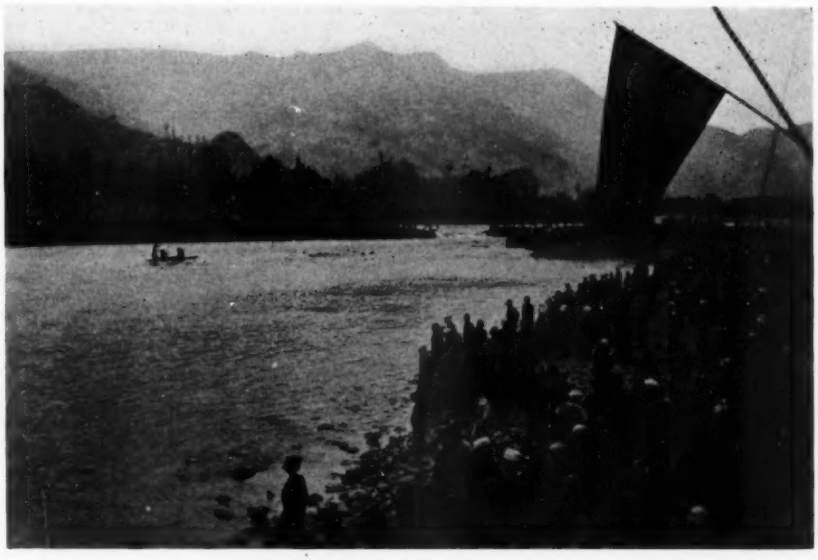
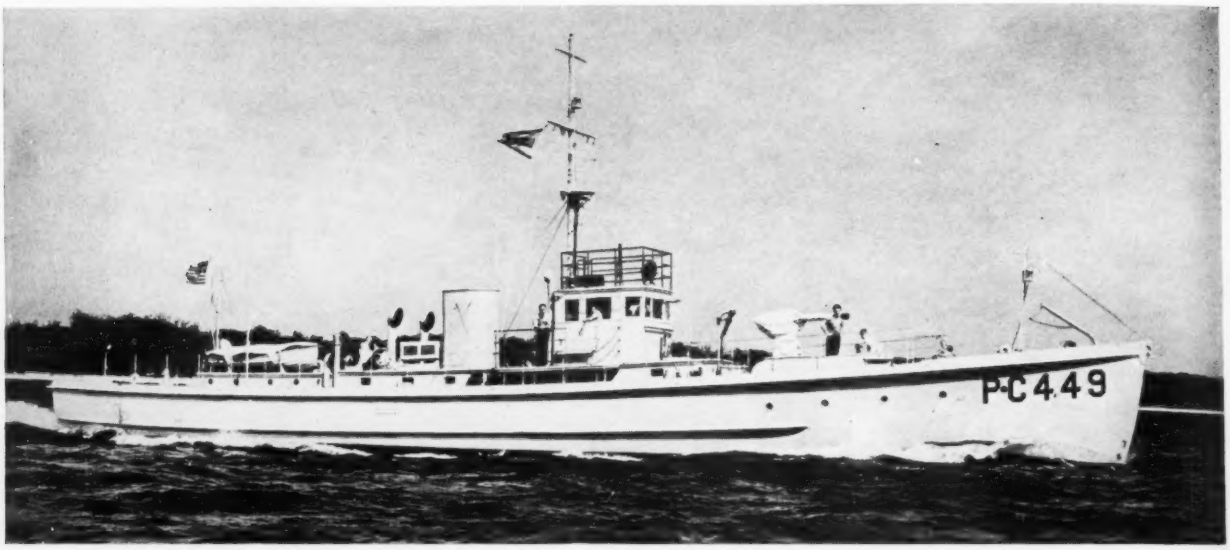


Laboriously, great sausages of bamboo are filled with rock and boulders to build a temporary coffer dam across the inner canal, so that annual repairs may be made. Later (Below), this dam is broken at the ceremony of the "Opening of Waters"

SHIPS OF WOOD AND GLUE

By CARL A. RISHELL



For centuries the length of a boat was governed by the height of the tree available for its keel. Now ships of this size are built by laminating small pieces of wood with glue

WOOD technology, which is as old as man, has always consisted fundamentally of dividing big pieces of wood into little ones. Today, wood engineers, reversing the process, are building better big pieces of wood from little ones.

It was always considered an obvious axiom that a timber could be no larger than the tree from which it was sawn. On that basis only the choicest trees, grown to great age, could supply large timber units. Now, however, timbers of any desired dimension can be constructed by laminating small pieces of wood with glue and they will actually be stronger than timbers cut from solid wood.

Take ship keels and knees, for instance. For centuries the length of a ship was governed by the height of the tree available for its keel. Ancient shipwrights went through the forest marking crooked trees to be cut for ship knees and tall ones for masts and spars. Even into this generation, builders of wood ships were handicapped by the limitations of nature in spite of all that has been learned about bending wood and splicing it with bolts.

It is estimated that only one tree out of every 200 in white oak forests is suitable raw material for ship timbers, and only a small portion of each of these choice trees will make bending oak. By use of the new laminating methods, practically every white oak and a far greater proportion of each tree becomes suitable for bent frames.

Practically all boat designs today call for solid lumber in which there are innumerable joints which are usually weaker than the rest of the piece. Scarfing and mechanical fastening has heretofore been the only satisfactory method of producing large keels, longitudinals and other ship timbers. Although many thousands of fine vessels have been produced by this method, results are not as good as when one-piece members of suitable quality are used, if for no other reason than that loss in strength must be compensated by increasing the amount of material. That in turn, affects the design which must necessarily be correspondingly heavier. As marine architects become more familiar with the possibilities of glued, laminated wood members, design will change to a lighter type of construction.

Glue laminating has been developed to a point where it is possible to build relatively small pieces of wood into keels or other members almost any desired length, width, thickness, or shape. The resultant timbers possess all the desirable features of solid wood and, for good measure, several added qualities.

Many of the principal joints can be eliminated by laminating, the result being stiffer, stronger members. Stem, keel and stern post, the three fundamental structural parts of a ship, are now being laminated in what is in effect one prefabricated unit without joints, bolts, or other fastenings.

Laminating members for marine construction is a precise and technical process. The equipment is not to be compared with that used for laminating land structures, such as columns or trusses. The boards which go into laminated ship members must be planed to such a uniform thickness that the desired finish can only be obtained by the highest type of cabinet surface. The clamps, jigs and heating equipment must also be specially designed.

As laminated timbers are usually made from stock one inch or less thick, the quality of the material can easily be controlled. If one of the laminae contains a defect, it may be cut out or the board discarded without a great deal of loss.

These developments result in the following improvements in shipbuilding technique: Full length, one-piece keels with stems attached can be made to provide four to eight times the strength of the bolted keel; stronger frames than those bent by steam; wood members manufactured at the proper moisture

content; prefabricated parts which entail a minimum of waste; material reduction in the weight of the boat; man hours of labor for faying, bending and fastening reduced to a minimum; and the elimination of bending equipment and other machines.

The history of glue laminating dates back many years prior to the discovery of modern waterproof glues. Wood spars for racing vessels and paneling for interior trim were frequently glued, and a few attempts were made to glue keels. Fairly satisfactory results were obtained with the so-called water-resistant glues provided the glue line was sufficiently well protected from moisture with varnish or other external coating. Underwater parts, or even parts only partially exposed, were not as a rule satisfactory when built with these glues. Discovery and development of modern resin glues that provide a strong waterproof bond for wood made possible marine plywood and laminating parts of solid wood.

In 1940, the Navy, anticipating an increased demand for shipbuilding lumber, began to explore the possibility of laminating ships' parts. At that time the best glues were believed to be the phenol resin type which had been fully proven in marine plywood. The difficulty was that high temperatures were required for polimarization. Heat can easily be transmitted through thin veneers of plywood, but the problem of transmitting heat through the comparatively thick laminated members is more complicated. Glues have to be used on relatively dry wood, whereas the moisture content has to be kept as high as possible to reduce the amount of final swelling when the parts are immersed in water.

Urea resin glues seemed to offer a solution, for they could be set at low temperatures, approximately seventy to eighty degrees Fahrenheit, and are considered waterproof. Keels with stems attached, horn timbers, shaft logs and frames for two fifty-foot boats were completed in 1941 and put in the water. All the laminated materials in these boats were white oak. One of the maritime services in 1942 launched a twenty-four-foot boat with a keel and stem laminated of Douglas fir with urea glue. It has since been examined periodically and no delamination detected.

On the other hand, the two fifty-foot boats with laminated oak members were pulled out of the water for examination and considerable delamination was found. Laboratory experiments indicated that the present urea glues, when used with oak in salt water, become useless, because of the effect of acid on the glue. This was discouraging, but new glues which are not affected by acid, salt water, or the other usual factors of exposure are being investigated. The most promising of these are the so-called low temperature phenols, particularly those in which alkali accelerators are used. Although the temperature required to set these, approximately 150 degrees Fahrenheit, is somewhat higher than for

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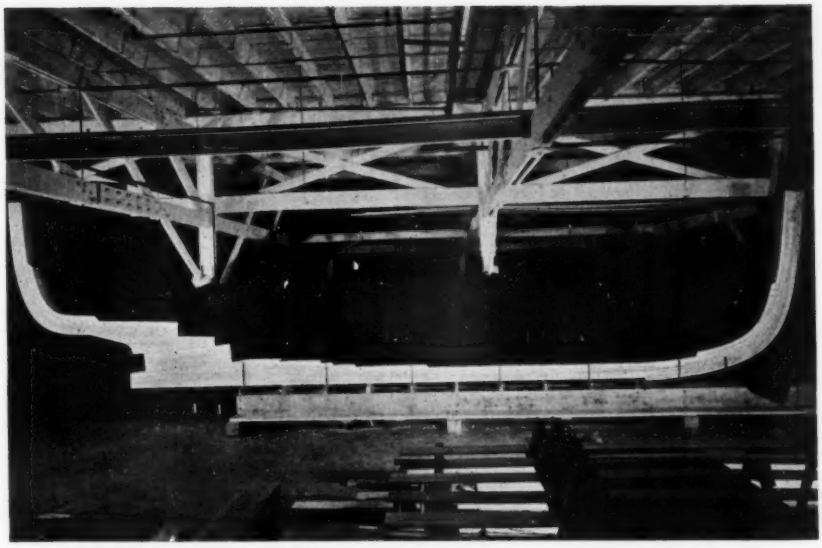
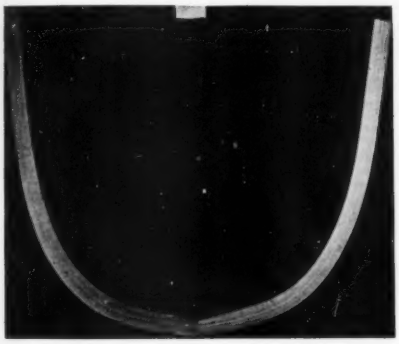
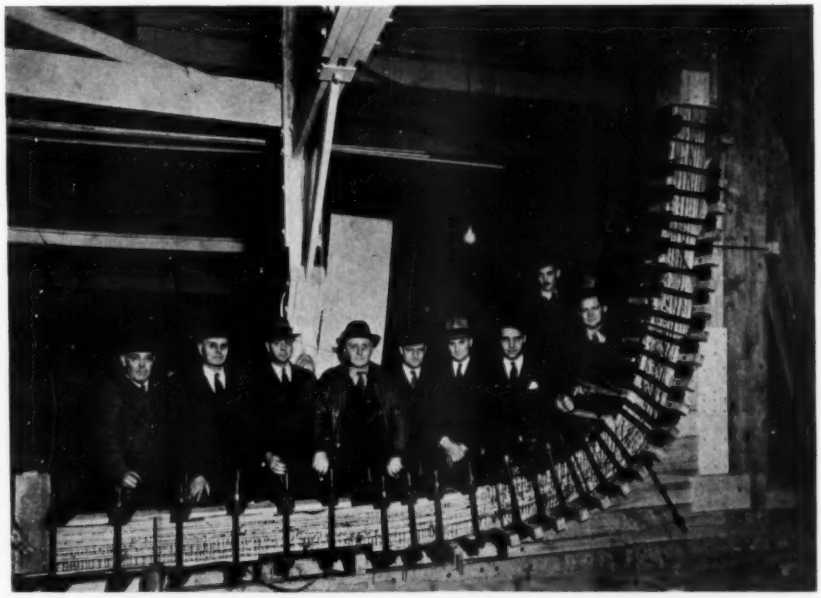


A prefabricated unit without joints, bolts, or other fastenings is this laminated stem, keel and stern post



There are no weak points in this laminated rib of white oak



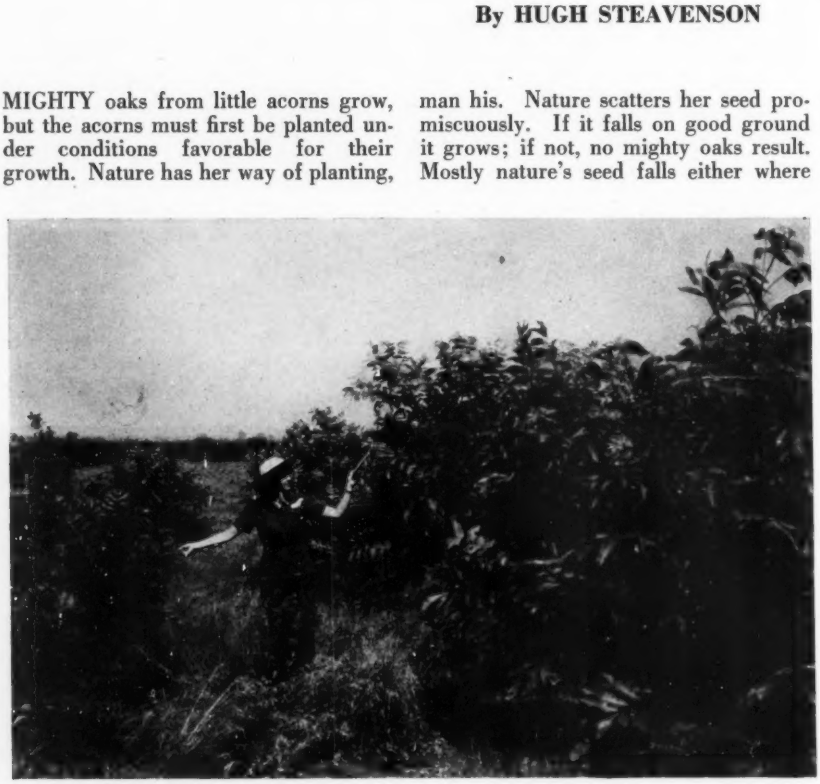
Keel and stem in place, ready for curing. Glue provides waterproof bond for timbers an inch or less thick

SEED OR SEEDLING?

An Interesting Question — and Experiment — In the Planting of Heavy-Seeded Hardwoods

By HUGH STEAVENSON

MIGHTY oaks from little acorns grow, but the acorns must first be planted under conditions favorable for their growth. Nature has her way of planting, man his. Nature scatters her seed promiscuously. If it falls on good ground it grows; if not, no mighty oaks result. Mostly nature's seed falls either where it will not grow or is not needed. She must therefore produce thousands, perhaps millions, of acorns to obtain one mighty oak. Man, because he can pick his planting sites, can be much more economical of seed. He has two standard ways of making his plantings. One is to plant the seed where the tree is to grow, the others is to plant it in a nursery where it will start its life under the most favorable conditions. Later, when it has passed the critical period when mortality is always high, which is usually from one to five years, he transplants it to its permanent location.



So far, the seed seems to win—trees from the same lots of seed, but those on the right were planted in place, while those on the left were nursery seedlings, transplanted. Upper—pecans; lower—red oaks, both in Missouri

Advocates of "direct seeding" and those of the use of nursery stock have engaged in a hundred years' war. For most species, the transplant method seems to have won in the test of battle. At least this holds for practically all softwoods and light-seeded hardwoods. Heavy-seeded hardwoods such as oaks, walnuts and a few others seem to be an exception. They develop a deep and fleshy tap root early in life, which must be broken when the seedling is transplanted. The resulting shock to the tree sets back its growth in its new location, as explained by Louden, in 1844, in his *Arboretum et Fruticetum in Britannicum* where he says: "In Europe and America, the tree (black walnut) is universally raised from the nut, which . . . ought to be sown immediately, as it seldom retains its vital power more than six months after it has ripened. . . . If the nut is planted where the tree is finally to remain, it will grow up with greater vigor, and not be retarded by that check which is always given to transplanted trees by transplanting." In a similar vein this venerable sage admonished concerning the establishment of oaks and hickories—plant the seeds of these "species which have very long tap-root, which are nearly destitute of fibres" where the trees are to have their permanent home.

Beginning in 1935 at the Soil Conservation Service nursery at Elsberry, Missouri, the writer put Louden's theory to test. Rows of ten species of transplanted trees were established alongside similar rows propagated by direct-seeding. For a given species, the trees established by either means were from the same lot of seed and were thus the same age from

seed. The only variable was that the transplant row in each case was established by planting one-year old nursery seedlings while the direct-seed row resulted from seed sown in place. The test procedure provided that the same number of seeds used to produce one transplanted seedling were also used to produce one direct-seeded plant.

The seedlings grew undisturbed through the 1936 season. Early in the spring of 1937, they were transplanted to their permanent positions. These transplanted trees made very little growth during the first season. The question was, would their growth rate catch up in 1938? Measurements in the fall of 1938 showed that the height growth of the transplanted black walnut averaged only three and six-tenths inches for the year, while the walnut grown in place averaged nine and two-tenths inches! For bur oak the readings were one and five-tenths and two inches; for red oak one and seven-tenths inches and two inches; for pecan five-tenths of an inch and one and three-tenths inches; for honey locust four and one-tenth inches and five and eight-tenths inches. Only the Kentucky coffee tree seedlings failed to grow faster than the transplants. Here the growth rate was approximately equal. In succeeding years the growth of the other seedlings remained greater than that of the transplants.

Similar tests in other parts of the Mississippi Valley made by the Soil Conservation Service have yielded comparable results. There is reason to believe roughly equivalent differences in growth would be obtained in other hardwood regions of the country. Whether transplants growing under similar conditions to direct-seed stock will eventually catch up to them is as yet undetermined.

It is well known to foresters and nurserymen that tree seed grows best in the locality where it originates. For example, black walnut grows in both Wisconsin and Tennessee. It would be safer to use Wisconsin seed in Wisconsin and Tennessee seed in Tennessee. It is often difficult or impossible to ascertain the seed origin of nursery stock or seed purchased from a dealer. But when one plants small quantities of nuts or acorns he can gather seeds from his own locality. Furthermore, he can even select the kind of parent he wants for the trees in his plantation. This, too, is important. Progeny from a tall, stately pecan, if planted on a similar site, have a good chance to develop into tall stately trees also. There is even evidence that a walnut tree bearing an exceptionally thin-shelled or otherwise desirable nut may transmit this character, in part at least, to its offspring.

Not all seed, even from good trees, is good seed. Insect larvae of the nut weevils delight in making their homes in acorns, chestnuts, and to a lesser extent other nuts. Such infested seed will never sprout. It is not always possible to tell weeviled nuts from sound ones. A simple test is to dump the whole collection in a tub of water. Weeviled seed will float and can be discarded. Seed collections may also be fumigated or otherwise treated to prevent weevils from spreading to the sound nuts.

Most nuts and acorns are dormant and require an "after-ripening" period before they will germinate. It is also a problem to store nuts and acorns over winter so as to maintain high viability. The after-ripening and storage problems may be solved by nature's method of planting the seeds soon after they are gathered. If the right sites and planting method are selected, the natural environment will carry the seed through to springtime in a perfect condition for prompt germination.

Planting an acorn or nut is not complicated. Nature just drops them on the ground and depends on wind and rain to cover them with a thin layer of duff. Deep planting is therefore to be avoided—a couple times the diameter of the seed is a good rule-of-thumb. The seed should be in contact with the mineral soil and if the seed-spot can be protected with an inch or so of duff or mulch, so much the better. A stout cane is as good a planting tool as any—a pointed stick will do.

A word of advice on where to plant: Nearly every farm or estate has odd corners useless for ordinary crops or lawns, but good for trees. Get them into something useful. Nearly every woodlot has open spaces producing nothing. Fill them in, but do not waste seed under the shade of other trees which are destined to remain standing for many years. The seed may sprout and grow for awhile, but the young trees will sooner or later be "shaded out." If the planting site is very brushy, it is advisable to keep the brush down for a few feet from the planting holes. Otherwise the seedling will be "choked out."

Some planters will want to concentrate on timber-producing trees — oaks, for example. These had better be planted fairly close together and treated as part of the woodlot. Others will want edible nut-producing species—walnuts, pecans, or blight-resistant chestnuts. Plant these in the open and further apart.

As to soil conditions: Most nut trees or oaks desirable for planting demand fairly cool, moderately moist, and relatively well-drained soils. Chemical fertility is not so important, but sites with some protection and a deep sub-soil, well aerated but yet moist, are necessary for satisfactory development of the nut-bearing trees. If your planting situation is exposed and the sub-soil is a dry sand or gravel or a tight, plastic clay, it would be much better to order coniferous trees from a forest nursery, after having obtained competent advice as to the species best suited to your part of the country.

Squirrel-proof tin can planting —the can, bottom removed, top "orange-peeled," contains the acorns or nuts. Below — a bur oak acorn eight months after planting in a can

One of the long standing objections to direct-seeding is that tree seed is the standard food of many rodents, such as squirrels and mice. Thousands of pounds of planted seed of all tree species have disappeared down the alimentary canals of these animals. Squirrels

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BLACKOUT

By GRACE V. SHARRITT

There was no moon, but the stars shone bright. Against the soft brilliance of the midnight blue sky, delicate leafed branches of the maple made an arc. "God's covenant with man," I thought.

It was quiet now—and almost beatifically peaceful. Almost—but not absolutely. The last mournful wail of the air-sirens still echoed above the dark, silent roof-tops. A warden patrolled the street, his heels making rhythmic, clicking noises, reminders that this blackout portended grim business —not a scene in a play.

There were no other human sounds, no dogs barking excitedly, nor children's questioning voices in the night as there had been in the previous tests. But there were other sounds of a kind, for it was yet summer. Reassuring, familiar sounds of a way of life unchanged as yet by man or war.

These blessed sounds were those of a multitude from insects' wings in the prairie grasses and Queen Anne's lace bordering the garden fence. Field crickets, katydids and the "zing" of locusts lent a sort of enchantment to the night. They relieved the tension of the moment,—robbed the future of some of its terror for which this blackness now was preparatory. Blessed sounds in the dark.

Now a bird "cheeped" sleepily in the maple. "A sparrow dreaming?" I wondered. Do sparrows dream? And why should they not?

A star fell in the sky, swiftly, silently—that sky which was so disarmingly peaceful above my open second-story porch, where branches of a tree diffused loveliness against the shimmer of silver and made an arc in the blue. That sky which over half of the world was split with death and gunfire and destruction.

"Why?" I asked again of the beautiful, starry heavens above me. "Why?" There was no answer. Unless it might have been the whistle of the "All Clear" which now came cheerfully into this brief fantasy of war and peace; of darkness and light.

One by one, bright windows appeared in the homes of my neighbors. Cars, parked quietly along curbings, roared their engines and were gone out of sight. The street lamps made white brilliance of the night. The civilian army's work for the moment had been completed. We were "at ease."

I looked into the sky above. The maple branches no longer made silhouettes against the pale candle-power of indistinguishable planets.

But among the grasses and milkweed and flowering chicory of a vacant city lot the musical sounds of an insect orchestral arrangement still made melody. A melody of a peaceful way of living. Of that life which had not yet changed outside my door. A life of which, please God, in each far corner of the earth, a memory shall forever remain to inspire the hearts of those whose skies were not bloodless.

Editorial

We Should Give Thanks

THE importance of wood in the conquest of Hitler's Europe cannot be exaggerated. In a very special sense it is the key to that conquest, for without wood it is doubtful if the vital sea lines of supply could be sustained. Millions of feet of lumber have gone and are going into our expanding Navy and maritime services; additional millions are required to box and crate the weapons of war which form the cargoes of huge convoys that stream from our shores to distant bases. Had our forests failed in this hour of need, Eisenhower's armies might have stalled in Africa, there might have been no beachhead at Salerno, no western front across southern Italy.

That our forests did not fail, that they have supplied, are now supplying, and will continue to supply war's unprecedented demand for wood, is due in no small measure to the organized conservation movement in America. The men and women who labor in woods and mills getting the timber out are performing a production miracle. To them all honor is due. And tribute also should be paid to those men and women whose vision and unceasing efforts over half a century have shaped and guided the reforms and policies that turned us from a nation of despoilers. No one familiar with our natural resource history will for an instant question that the conservation principle they founded and nourished is now paying handsome dividends.

To catalogue their accomplishments, which range from the simple process of planting trees to the intricacies of research in wood technology, is not the purpose of these lines. It is to suggest that when we pause this Thanksgiving to take stock of our blessings, we reserve a word of thanks for those Americans whose faith in the principle of conservation has endured. Because it has endured, our forests were the more ready to answer the call to arms. And because they were ready, the balance of victory is swinging in our favor.

A Tax on Forestry

OVER a long period of years the Congress has appropriated some billions of dollars to protect the forests of the United States and encourage its citizens to practice forestry on their woodlands. Among these billions, some millions have been expended on the study and attempted reform of state and local property taxes on forests. The Forest Service has issued innumerable reports on the subject—one of them nearly two inches thick.

Although Uncle Sam has spent much time and money to induce the states to tax forests in a logical way, paradoxically he does not do so himself although he is a tax collector of the first order as even the least of us is well aware these days. Income from forests is taxable as are other forms of income under federal income, excess profits and capital gains tax laws. These taxes illogically applied to the business of forestry may and, it now appears, are having the effect of penalizing forest owners for doing what the government has long urged them to do—grow and harvest forests on their own lands under good forestry methods. More than this, they are tending to defeat the action of those states which have passed special forest tax laws designed to encourage their citizens to keep forest lands growing timber.

It is not necessary to say that the income tax law is complicated, nor is it our intention to go into its intricacies, particularly since we are none too certain how to figure our own modest tax in which the capital gains tax unfortunately plays no part. But as respects the federal law as it applies to forest properties, the crux of the inconsistency seems to be that the law as now written makes it necessary for the government to impose a higher tax on the forest owner who cuts his own timber than it does on the man who sells his timber outright to another person.

To bring the matter down to a hypothetical case, John Jones, who has engaged in a longtime timber growing undertaking, must pay Uncle Sam a much heavier tax if he harvests his timber himself than if he sells it to another person. The reason is that as a harvester of timber he is subject to the ordinary income tax, whereas if he sells his timber outright to someone else the lower capital gains rate applies. Obviously, the effect is to handicap and discourage timberland owners and industry in the growing of timber and the management of forest properties on a permanent timber cropping basis. And by the same token, it serves to cancel out benefits which a number of states have provided their citizens in the form of more equitable property taxation for longtime forestry enterprises.

It is, therefore, timely that a committee of the forest industries, known as the Forest Industries Committee on Timber Valuation and Taxation, after a study of the workings of the law, is bringing the situation to the attention of the House Ways and Means Committee in the hope of having the Internal Revenue Code amended to correct these inequalities—inequalities which, incidentally, do not apply to other enterprises dealing with natural resources. Undoubtedly, Congress did not intend the law to be a tax on forest enterprise and when it clearly understands the adverse effects upon both private and public forest policy, it will be expected to give the situation fair treatment.

WIZARD OF SHERWOOD

Want To Know How to Raise Quail? . . . Herbert Stoddard Has All the Answers

By CHARLES ELLIOTT

Herbert Stoddard made precise science work in everyday harness

ABOUT twenty years ago, a young museum taxidermist and ornithologist by the name of Herbert Stoddard was hired by the United States Biological Survey and sent down into the piney woods of southern Georgia for the purpose of gathering information on bobwhite quail. The young scientist was one of those rare individuals endowed with initiative, vision and practical horse sense in proper quantities. It was because of his ability to make precise scientific data work in everyday, toil-worn harness, that he had been selected for this important mission.

Herbert Stoddard laid down the foundations of his studies on food, cover, predation and protection. As in all other game species, these were essential in the development and maintenance of an adequate quail supply. The problems to be solved were determination of the type and variety of food, the quantity and location of cover and the amount of protection from both man and natural enemies to bring the quail crop on any land to the largest number that a well balanced farm and plantation would support.

That job has been carried on intensively for nineteen years. Herbert Stoddard is no longer an official of the federal government. He is today director of the Cooperative Quail Study Association, a group of plantation owners whose combined estates total more than 750,000 acres. In this job Mr. Stoddard is making a real contribution to game management in the South. On Sherwood Plantation, his own small tract of a thousand acres near Thomasville, Georgia, he puts into practice all his theories and experiments and ideas. If they work, he streamlines them for the big plantations which belong to members of the association. The members pay their pro-rata share of the costs to keep this study alive and vigorous and progressive.

Mr. Stoddard and his trained assistants have placed quail raising in a state of nature on a sustained yield basis, which is the same kind of program foresters practice to make the woods produce a perpetual supply of lumber, or wood and other forest products. On each area they attempt to build up the quail supply just as you and I would put pennies in our savings account at the bank. And it works.

One of the most astonishing facts to the average sportsman is that under good practical management, *ten acres* are needed to produce one quail a year for harvest. That, of course, is over a large acreage, and on a management basis.

The largest quail population the scientist has been able to reach on his own thousand-acre experiment station is one bird for each acre. This applies only during the most favorable seasons. At such times a covey of twenty quail will range over approximately twenty acres of land. But the studies have showed that it is seldom wise to harvest over a hundred quail for each thousand acres of land, on the average. Bad seasons often follow on the heels of good seasons. When this happens after heavy shooting, the quail population might be reduced to uncomfortably low figures.

"Some folks I know," said Herbert Stoddard, "place the same value on a quail that they place on a good milch cow."

He hastened to explain that statement. "A sportsman may own a 10,000-acre estate and desire his hunting along deluxe lines. We'll take that as an example. To purchase the land, build the proper houses, barns and other necessary buildings, make roads and trails, clear for food patches and do all the necessary work may cost him up to $200,000. Five percent interest on this amount of money is $10,000 a year.

"Maintenance costs on a 10,000-acre estate often run up to $30,000 a year. Some spend more, some a great deal less. That means, though, that the annual interest and maintenance costs will usually be around $40,000 for the 10,000 acres.

"The number of quail which may be safely harvested each year from a preserve of this size is approximately a thousand. That means that each quail harvested may cost the owner of such a plantation around forty dollars. You can purchase a fair cow for that much money."

Of course the findings of the Cooperative Quail Association do not stop at this point. The facts and figures, available to all those who desire to raise this fine game bird, show also that any owner of suitable land can produce quail for himself and his friends at small expense. And Mr. Stoddard says that while some day quail shooting will be the grand opera of all upland game shooting, the hunting now may be as simple or as elaborate as one cares to make it.

Herbert Stoddard has upset a good many theories that foresters have about southeastern forest fires. While his studies have been primarily in connection with quail propagation and management, many of the results may be applied to southern farming and forestry. In the course of his work, some interesting facts have been uncovered about the management of several species of pine trees on lands where controlled burning is practiced as a routine quail management measure.

First, he has demonstrated that fire is an essential factor in maintaining high quail populations on heavily forested land in the southeast. Longleaf pine forest, for example, protected unreservedly from fire for several years, will develop an understory of bush and brush and grass. This mat of vegetation chokes out the desirable herbaceous plants which produce seeds that are necessary in the diet of a quail. Second, the dense undergrowth harbors mice and other types of rodents which would be unlikely to pass up a feast of juicy quail eggs. Third, the quail simply do not choose to live in places which provide hiding places for cats, foxes and other predatory animals. And if the birds did prefer to live under such conditions, hunting them would be more like a difficult job than a pleasant pastime. The enthusiastic director of the association has no difficulty in convincing you that if quail carried matches, all foresters who belong to the keep-forest-fire-out-at-any-cost school of thought would soon be white-headed or in padded cells.

The scientist can list many reasons why properly controlled light burning improves longleaf timber, which is the predominate species growing on land under the management of the association. In heavy, massed brush and grass, the bulk of the winged longleaf seeds never reach the ground. Hung suspended in the air, they soon lose their viability. Seeds which succeed in working their way to the damp ground cannot meet the competition of the million roots already there. If they sprout, they are choked out and killed by the heavy undergrowth. Dense "rough" is always a dangerous fire hazard, and during dry weather must be watched day and night. Fire, burning in summer through six, eight, or ten year rough, will kill enormous forest trees, or weaken and expose them to all types of tree fungi or forest insects.

Those are some of Herbert Stoddard's arguments. If you don't believe them, he'll crank up his gully-jumper and transport you cross country into some of the nearby plantations where such experiments are being conducted and prove it to you. He'll show you big forest trees where controlled burning is practiced periodically. You may search the trunk, but there is not a fire scar upon it. The floor of the forest is covered with short grass and food producing legumes, except in occasional patches which have been plowed around and left for cover.

But, he insists, the practice of burning must be carefully and intelligently controlled, or it will lose its effectiveness. Late winter or early spring before the season of quail nests is the proper time to burn. That insures cover and food supply for the quail crop in the fall.

Mr. Stoddard puts his foot down against the trapping of hawks and owls on the plantations. "With the exception of blue darters, or Cooper hawks," he said, "they don't get enough quail to do any damage. When they do catch quail, they take the slowest, weakest birds, thus improving the strain as a whole. And they do keep down snakes and rodents which prey on quail and quail eggs. They are far more beneficial than they are harmful to a quail management program."

It is also important to keep foxes, skunks and opossums under regulated control and there is a standing order that all stray cats and dogs must be eliminated on sight.

There are many other things about quail—enough to fill the 559-page book this energetic authority wrote a few years ago. He has learned a lot since then, too. From time to time he issues bulletins on new data he has accumulated, and you can bet your last quail shell they're backed up with hands full of brown weed seeds and green stuff growing out of the ground, not to mention exploding bombshells of brown bodies that are more numerous along his trail than you'll find anywhere else on earth.

At the present time, members of the Cooperative Quail Study Association are directing their efforts and energies to farming, timber production and other activities of more direct value to the winning of the war. Mr. Stoddard and his associates are busier than ever assisting in these operations. As a result, the business of raising quail on the cooperating plantations has been reduced to

(*Turn to page* 557)

Under good management, says the wizard of Sherwood, ten acres are required to produce one quail a year for harvest

YOUR SHADE TREES:

Trees Must Eat and Drink

By L. E. MANNING

THE existence of a tree, as of all plant life, depends on its ability to use the power of the sun to transform natural minerals into living tissue. These minerals are its food. In woods and fields there are a thousand failures to every one seed that falls upon a piece of land beneath which lie the minerals which that particular kind of seed requires. Beneath each tree a thick litter of fallen leaves and debris slowly rots and restores its minerals to the soil from which they came so that the process is continuous. Air and water penetrate this litter easily—and roots need air to live and the minerals must be dissolved in water before the roots can use them.

In city or garden conditions, on the contrary, no such litter usually is allowed to remain. There is too often a neatly clipped lawn beneath the tree, and this acts as a blanket that excludes air and blots up nearly all the water. Slowly the earth becomes less and less able to nourish the tree, which may die of starvation, or at the best be dwarfed and weakened. Since diseases and insects are always present, and since a weakened tree has little resistance, a sickly, unsightly bit of greenery soon results.

The fact is, a tree is a living creature of the wild. If one caged a bird it would be fed and watered daily as a matter of course. Merely because trees can get along for a number of years without care, we too often neglect them altogether. If we neglect an animal it calls attention to itself vocally but a tree cannot do this. Nevertheless, for those who can see, it has a method of signalling its needs—a sort of sign language. Some of the simplest signs can be cited together with their meaning:

Leaves drooping—not enough water;

Leaves undersized—not enough food;

Short twig growth—semi-starvation, prolonged;

Few leaves, sparse—not enough nitrogen;

Huge green leaves, thick stems—too much nitrogen;

Many dead branches in the crown—general symptom of trouble, perhaps air, perhaps food, or perhaps water;

Tall, spindly growth—not enough sunshine;

Dwarf plants, grayish—lack of phosphorus;

Yellow leaves, perfect—lack of iron, best provided by increasing acidity;

Yellow leaves in mottled areas only—too little lime;

Yellow leaves, then dying from outer edges inward—needs potash;

Yellow leaves, then dying from midrib outward—needs nitrogen.

It should be noted that these signs and meanings apply only on established healthy trees, as newly planted or diseased trees may show somewhat similar symptoms due to other causes. Since many of the symptoms are due to food lacks, it may be asked: Why not use a soil test and find out accurately what is needed to balance the diet? The trouble is some soil tests do not show whether all needed elements are in a soluble form which the roots can use. For unless food can be dissolved it cannot be carried up to the leaves inside the water passages in the trunk where it is transformed into plant tissue. On the other hand, soil tests are positive and the interpretation of symptoms merely probable. If you possess one of the amateur kits being sold nowadays, it would be wise to make a simple soil test to confirm the symptom. But if the symptom be very clear in appearance so there is no doubt about it, then even if the soil test should show the exact opposite you had best believe the symptom rather than the test. But as a rule, of course, the test and symptom will agree and one can proceed with more confidence.

Those who live in cities are accustomed to think of fertilizers only as special brands advertised to contain "all necessary elements." Such commercial fertilizers are safe and sure in many cases, the only exception being where too much nitrogen is already present. They are made up of nitrate (usually ammonia); phosphates (usually super-phosphate); potash and traces of other elements such as lime, magnesium, etc. Of the many elements needed by a plant, all but the first three are usually present in all soils—even in cities. Manure contains all three, but is much weaker and is stronger in nitrogen than all other things combined so does not of itself make a balanced diet. The purpose for which a plant uses each of the three main elements of food is not simple, but diverse and sometimes indirect. A rough idea may be helpful: Thus nitrogen encourages vigorous leaf and root growth; phosphorus may be said to encourage roots and to aid in flowering and fruiting; potash encourages new growth to be firm rather than watery, and is important in maturing wood, leaves and fruit at the end of summer. This is not to be considered complete or entirely accurate, but a general and simplified version of a complicated subject.

The three elements can be obtained in natural and highly soluble form, nitrogen in dried blood; phosphorus in bonemeal, potassium in hardwood ashes. It will be noticed that all three are in powder or granulated form—as is commercial fertilizer. This is important in considering the methods of application.

To fertilize a vegetable garden, one merely spreads the fertilizer and hoes it in. For trees this will work in time, but their roots run much deeper. Therefore it is customary to make holes, as with a crow-bar perhaps twelve inches deep and pour fertilizer down. This practice has the advantage of keeping the fertilizer together so that it dissolves more slowly, yet deep enough to reach roots quickly.

Rain will dissolve the fertilizer fairly rapidly as it sinks down to the tree roots. The time of application is thus readily determined. To apply before March first is to risk most of it being washed away with the rush of spring waters long before the tree wakes up from its winter sleep and is ready for food. To apply after August first is to risk having half or more of the fertilizer left undissolved when the tree becomes dormant. That which is left unused will certainly be washed away before the following spring. The best time of application is the month of May, with a second dose only if needed in late June. Trees seldom need a second application as their root systems are so deep the slowly descending food continues to be useful all summer.

It is vital to place fertilizer just above the area where roots are awaiting it. The structure of the tree root system is some-

what like that of its branches. In the center are the heavy main roots, dividing as they approach the outer circumference of the mass, until most of the feeding roots are, like the leaves, on the very outside. It is usually true that the ground under the outer branches is directly above the most active roots, so a simple rule is to make fertilizing holes there—all around the circumference. Best make a second circle of holes a foot or two inside the outer ring as well. In very large trees a third or even a fourth circle can be added.

Such a series of concentric holes does more than provide receptacles for depositing fertilizer. It fills the surface of the earth with fresh air. The roots actually use oxygen in their work. In cities, where soot seals all breathing spaces between surface particles, the atmosphere underground contains little oxygen. Since carbon dioxide is constantly being formed underground by bacterial life, a choking atmosphere soon inhibits root activity unless aerated. But not air only is provided by such feeding holes. Water penetrates deeply into the ground only with difficulty unless some such entry is furnished. Indeed, in addition to the rings of holes, it is well to drive a spading fork into the surface six or eight inches in many places before watering. Such watering, of course, need not be resorted to unless the location is dry or in the event of a drought. But a few minutes of spraying does no good at all, and even half an hour's ordinary hosing probably does more harm than good, for only the surface few inches are wet and the roots are attracted too close to the surface where they may dry out between waterings. Trees are deeply rooted; watering must be really adequate. An hour or two for one medium-sized tree, perhaps, after the ground is forked. Such a flood, of course, will float up from its holes much of the fertilizer poured in. To prevent this it is usual to fill the top four inches of all feeding holes with loose earth.

Many gardeners water and fertilize their trees and shrubs upon a whim, or by rote, thus doing much harm. Too much watering leaches out the food in the soil and leaves the tree starving. Too much fertilizer may stop blooming, or more likely, encourage such luxuriance of growth that the new wood is sappy and weak and suffers from cold and wind the next winter. It is safe to say that more than half the time ordinarily healthy trees need *no* fertilizer or watering at all. Best leave them alone. Wait until they ask for it but take a look at them now and then. They may have been asking for water and you didn't know their way of saying it.

TREE QUIZ

By "MOOSEWOOD BILL"

1. What is the tallest broadleaved tree of eastern North America?
2. Which pine native to California grows like "Jack's Bean Stalk" in Australia where it is used in large scale afforestation?
3. What kind of leaves did the Ohio Valley pioneers choose for stuffing mattresses and why?
4. Name a northern conifer which sheds its leaves in autumn.
5. What is the difference between a "leaf scar" and a "bundle scar"?
6. What conifer used by archers does not have a cone as its fruit?
7. Can you tell by looking at a pine tree in autumn whether it will bear seed the next year?
8. Is "poison hemlock" a tree?
9. What tree has buds shaped like a duck's bill?
10. What alcoholic beverage gets its flavor from the fruit of a conifer?

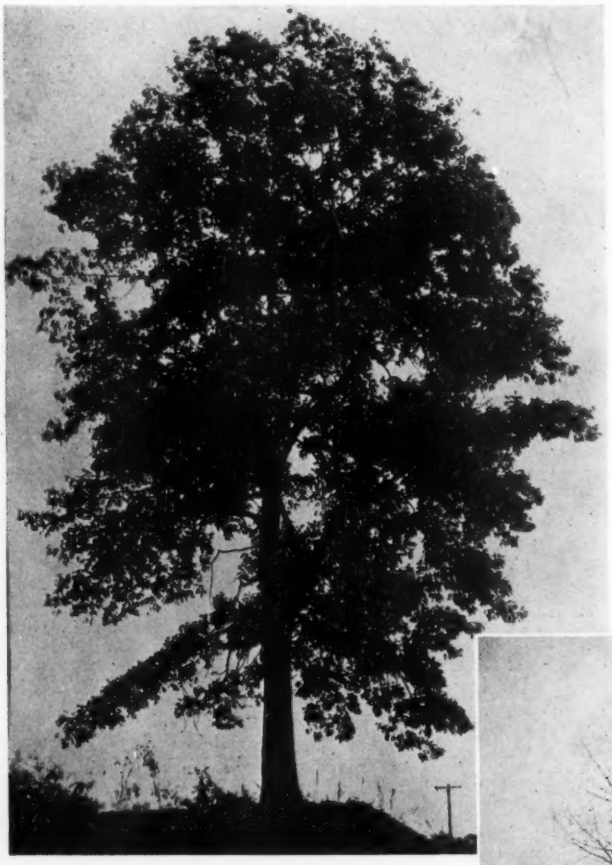
What Is It?

FOR ANSWERS—TURN TO PAGE 558

SOUTHERN RED OAK

***Quercus falcata*, Michaux**

By G. H. COLLINGWOOD



Forest grown Southern Red Oak is medium-sized with a long straight trunk, while in the open the trunk is shorter, and the branches wide-spreading

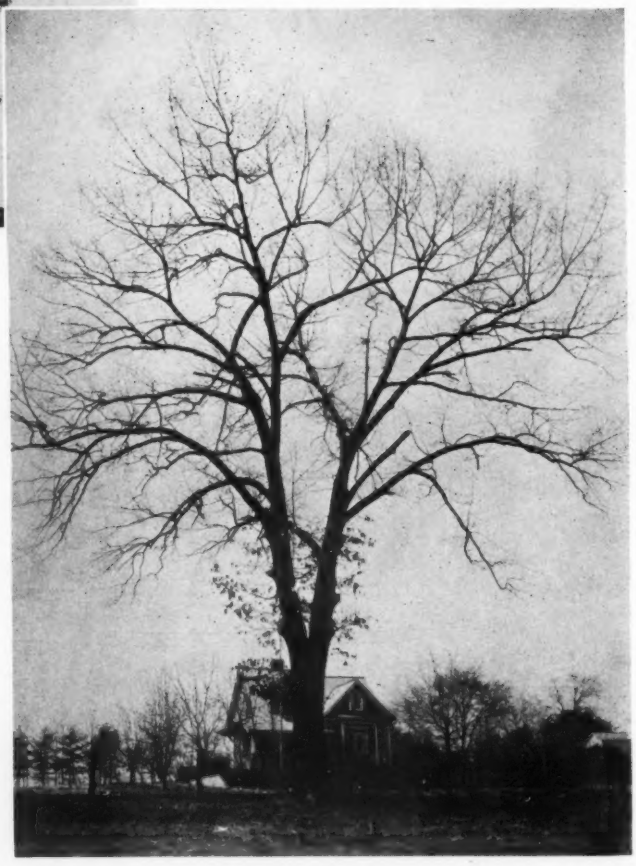
SOUTHERN red oak grows as far north as southern New Jersey and southeastern Pennsylvania, but is more common in the South Atlantic and Gulf States. Reaching into central Florida, it extends westward to the valley of the Brazos in Texas and northward into Missouri and the southern parts of Illinois and Indiana. The tree is also found in isolated portions of southern Ohio and western West Virginia.

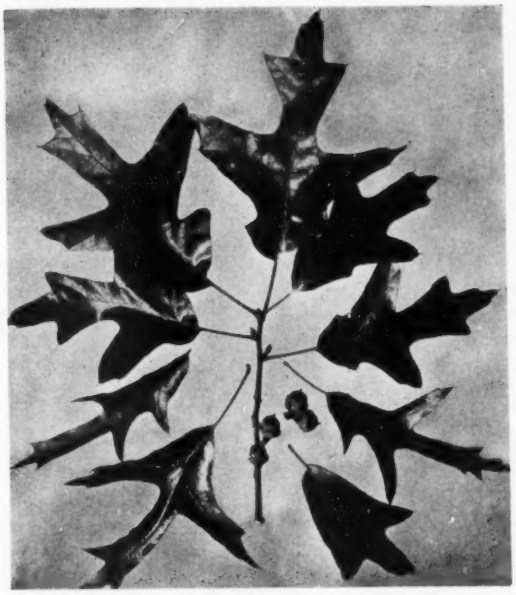
Locally called Spanish oak, Spanish water oak, spotted oak, turkey oak and red hill oak, the confusion of names entered the field of botanists and dendrologists, some of whom followed Marshall and Sudworth in calling it Spanish oak, *Quercus digitata*, while others followed Linnaeus in calling it southern red oak, *Quercus rubra*. Later Sargent revealed that Linnaeus' type specimen was the same as Michaux had earlier described as *Quercus falcata*. Accordingly, this is the name dendrologists have recently decided upon.

Usually a medium-sized tree, this species, when growing under forest conditions, has a long, straight trunk and upward-reaching limbs that form a high, rounded crown. In the open it develops a short trunk with wide-spreading limbs to form a broad, open, round-topped crown. Heights are usually from seventy to eighty feet, with trunk diameters of two to three feet, but trees one hundred feet high with diameters up to five feet have been recorded.

The dark gray bark on mature trunks is rough, with shallow fissures, and broad ridges. It may be three-quarters to one inch thick, but on limbs and on young trunks it is relatively smooth and lighter in color. Although rich in tannin, it has found no extensive use by tanneries.

The angular twigs are first dark reddish brown, covered with thick rusty down, and in their second year become dark red-brown or gray. Winter buds are an eighth to a quarter inch long and covered with chestnut-brown,





Varying in shape more than those of other oaks, the leaves are of two types. Acorns are about one-half inch long held by a stemless or short-stalked saucer-shaped cup

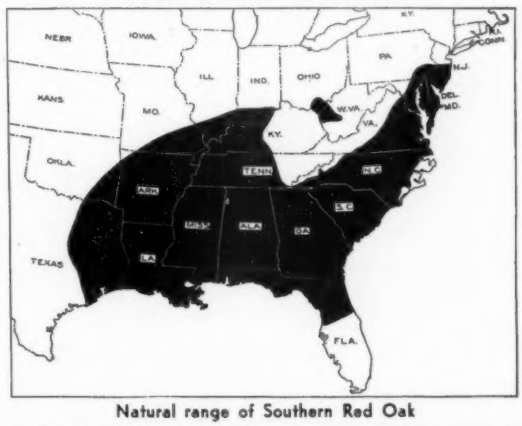
Opening in April with the leaves, the staminate flowers are arranged in pendant, hairy catkins

The dark brown or blackish bark is broken by shallow fissures into broad ridges

hairy scales. This oak belongs to the black oak group. Its leaves grow alternately along the twig. They are firm, dark green and glossy above, paler and downy beneath, and occur in a greater variety of shapes than do the leaves of most other oaks. In general there are two types. Both have a taperingly wedge-shaped or rounded base, but the finger type has slender, pointed or tooth-tipped lobes with the terminal lobe more or less curved after the manner of a scythe blade. This is referred to in the scientific name falcata which comes from the Latin word *falcatus,* meaning scythe. The other type of leaf resembles the outline of a bell, is less deeply cut, and the broader lobes are distinctly tooth-tipped. Both kinds may occur on the same or different trees—the finger-like leaves filling the bulk of the crown, and the broad-lobed, tooth-tipped ones of bell shaped outline on the lower branches. In autumn they turn dull orange or brown.

Flowers of both sexes appear on the same tree in April when the leaves unfold. The staminate or pollen-bearing ones are in clusters of drooping, hairy catkins, three to five inches long. The pistillate or acorn-producing flowers occur in pairs or singly on stout, hairy stems. Measuring about half an inch long, and maturing the second year, the rounded, bitter acorns occur singly or in pairs. They are about one-third covered by scaly, saucer-shaped cups.

Weighing about forty-three pounds to the cubic foot when air-dry, the coarse-grained, light red wood of southern red oak is hard and strong, has a few broad, conspicuous medullary rays, checks badly when drying, and is not durable in contact with the soil. It is used for general construction, slack cooperage, crates, furniture and fuel. Open pores extending with the grain of the wood render it unusable for barrels in which to store liquids.



Natural range of Southern Red Oak

Living Waters for the Ages

(*From page* 533)

percent of the total river flow. But above the narrow cut through the mountain, as dug by Li Bing, is a spillway which takes off surplus water and returns it to the outer channel. By this means, a constant volume of flow into the inner canal is assured to irrigate all lands on the Chengtu side of the river.

With the completion of all repair work came the annual "opening of the waters" ceremony, officially held on the second day of April this year. First the governor of Szechuan Province and high officials of the government made obeisance and honor to the images of Li Bing and his son, Er Wang, in their respective temples. This was accompanied by the clang of bells and loud reports of noise bombs and firecrackers. Then the official party, in which I was included, walked along the dyke of the inner canal to the Er Wang Temple, nestled among tall Nan Mu trees.

This temple to the son of Li Bing is the most beautiful I have seen in all China. It is elaborate with gold leaf and carvings and color. His is more ostentious than that accorded Li Bing for he was a filial son and carried out the plans and work of his father, which, according to ancestor worship, gives him great credit. At this temple, two pigs and two goats were offered by farmers of the plain as sacrifice to Er Wang, in gratitude for the life-giving waters that come each year. Priests with shaven heads officiated at the ceremonial sacrifice.

After this colorful ceremony, the party moved on to where the coffer dam was being broken down to release the waters. Twenty men, pulling on a bamboo cable, had already relieved many of the tripods of their mats filled with boulders. Finally, when formal speeches had been made, and with loud reports of noise bombs and firecrackers, workmen began removing the tripods and the waters poured through with a mighty roar. Thus again, for the two thousand two hundredth time, the waters of the Min River were divided for another season of irrigating a half-million acres of the Chengtu plain.

But many of the 40,000 blue-clad Chinese who had gathered for the ceremony were loath to go. Men and boys remained to skim rocks over the water just as they enjoy doing in America. Men on long rafts were dexterously spearing with long poles and hooks for pieces of timber floating away from the break-up of the dam, for such timbers become the property of whoever recovers them.

During the celebration, American-trained Chinese engineers discussed with me their plans for improving this age-old irrigation system once they had educated the farmers to the idea of change. They wanted to build a great diversion dam across the Min Valley in the gorge before it opens on its out-wash plain. This would divide the Min River into three parts instead of two, as the Li Bing headworks do. The inner canal would remain the same. The present outer canal would become the floodway overflow, controlled by movable gates that would spill excess flood waters into this channel. No diversion canals would be taken out of this floodway, thus avoiding annual damages to such structures.

They would then construct an entirely new outer canal which would take the place of the one utilized as a floodway. This plan would provide for the storage of water, resulting in a supply sufficient to give the entire plain a thirty-foot annual coverage. Since this is not needed, additional thousands of acres in the Chengtu plain could be brought into cultivation. The power which could be produced, and which is much needed, would be an even greater asset.

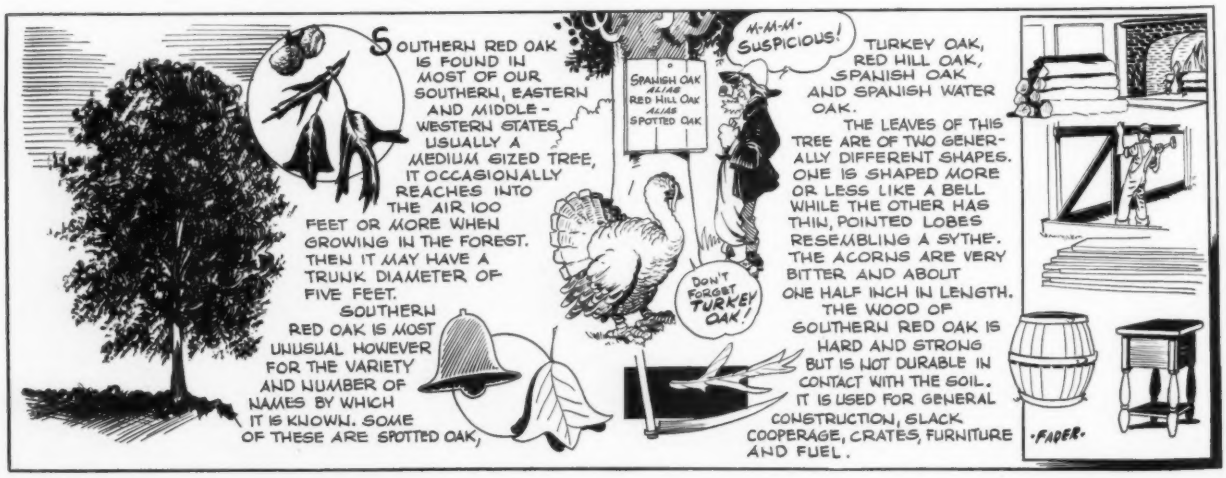
It is important, I believe, that these changes be brought about. I am told that the Li Bing irrigation works are being threatened for future longevity by the present rapid denudation of the steep mountain slopes in the drainage area of the Min River. The virgin forests are reported as being extensively cut without measures to safeguard the land.

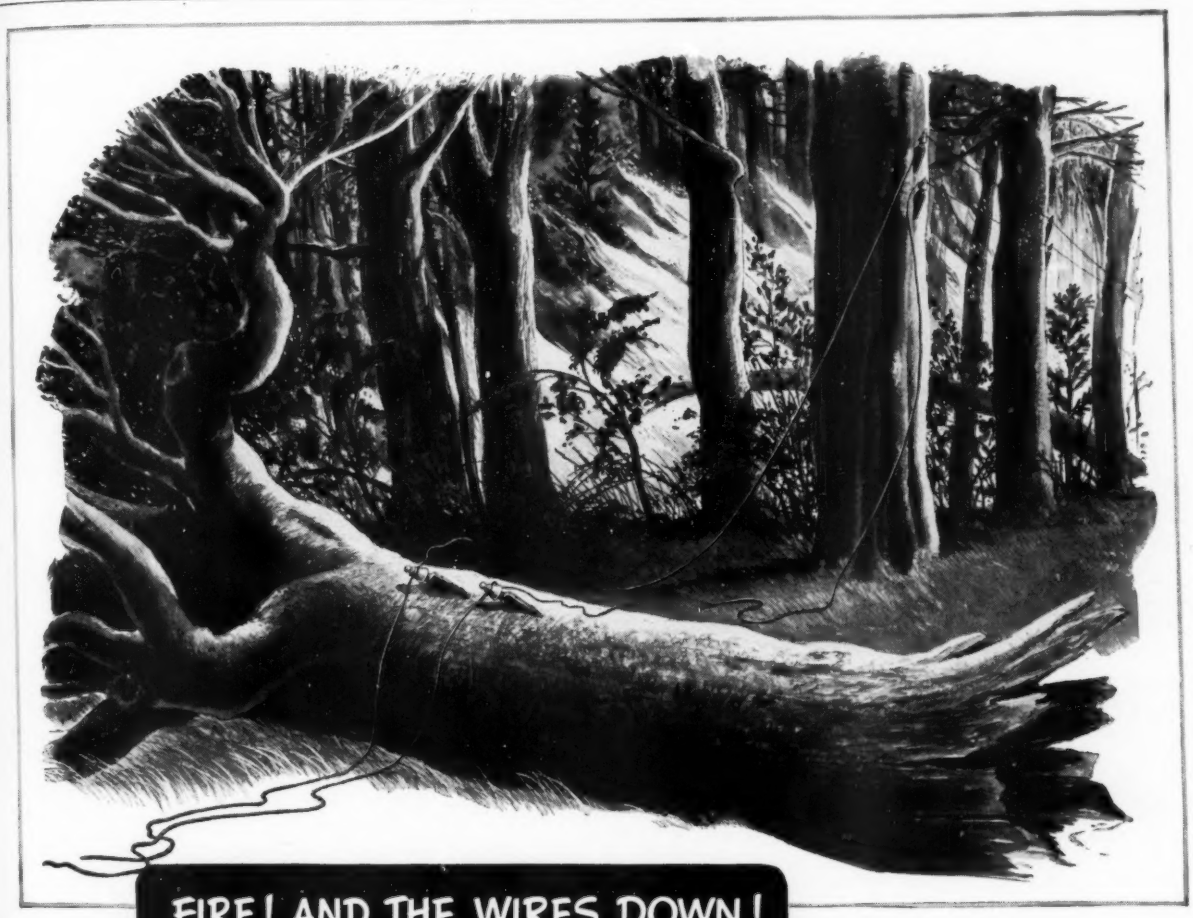
On a trip through the gorge of the Min, I was astonished to find cultivation extending as high up as I could see, sometimes even on gradients of a hundred percent. The ridge was lost in a cloud bank, but splotches of gold here and there told me that rape-seed for cooking oil was being grown even above the cloud level. Two farmers were encountered clearing a hundred percent slope to plant corn. So steep was their field that loosened stones rolled all the way down to the stream bed. Later, in a graveyard where thousands upon thousands have been buried, I sat and talked to the seven leaders in conservancy, forestry and farming who were with me.

As we looked up the steep slopes at the bad examples of land misuse, I posed this question: How are we to get these farmers to give up cultivation on steep slopes? One of my companions, trained in Germany, wanted the government to lay down strict laws and force the farmers to comply. Such a plan, I observed, could not last. I tried to get him, and

(*Turn to page* 556)

TREES AND THEIR USES—No. 79—SOUTHERN RED OAK


SOUTHERN RED OAK IS FOUND IN MOST OF OUR SOUTHERN, EASTERN AND MIDDLE-WESTERN STATES. USUALLY A MEDIUM SIZED TREE, IT OCCASIONALLY REACHES INTO THE AIR 100 FEET OR MORE WHEN GROWING IN THE FOREST. THEN IT MAY HAVE A TRUNK DIAMETER OF FIVE FEET.
SOUTHERN RED OAK IS MOST UNUSUAL HOWEVER FOR THE VARIETY AND NUMBER OF NAMES BY WHICH IT IS KNOWN. SOME OF THESE ARE SPOTTED OAK,
SPANISH OAK ALIAS RED HILL OAK ALIAS SPOTTED OAK
M-M-M- SUSPICIOUS!
DON'T FORGET TURKEY OAK!
TURKEY OAK, RED HILL OAK, SPANISH OAK AND SPANISH WATER OAK.
THE LEAVES OF THIS TREE ARE OF TWO GENERALLY DIFFERENT SHAPES. ONE IS SHAPED MORE OR LESS LIKE A BELL WHILE THE OTHER HAS THIN, POINTED LOBES RESEMBLING A SYTHE. THE ACORNS ARE VERY BITTER AND ABOUT ONE HALF INCH IN LENGTH.
THE WOOD OF SOUTHERN RED OAK IS HARD AND STRONG BUT IS NOT DURABLE IN CONTACT WITH THE SOIL. IT IS USED FOR GENERAL CONSTRUCTION, SLACK COOPERAGE, CRATES, FURNITURE AND FUEL.
·FADER·



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RCA will gladly answer any questions about any type or application of RCA Emergency Communications Equipment. While availability of the equipment is limited by war priorities, any information you can give us now regarding your future need of such equipment will help us serve you better just as soon as the war permits.

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Radio Corporation of America, Camden, N. J.

Forest Service Chief Criticizes Forest Industry Policy

A POSTWAR forest program for the United States, featuring public regulation of cutting practices on private forest lands, public assistance to forest landowners, and increased public forest ownership, was proposed by Lyle F. Watts, chief of the United States Forest Service, in an address before the Wisconsin-Upper Michigan Section of the Society of American Foresters at Milwaukee late in September. He also advocated a postwar public works program of forest rehabilitation.

In the course of his speech, Mr. Watts took occasion to charge the forest industry with carrying on a campaign to defeat public regulation recommended by the Department of Agriculture.

Questions State Control

Stating that the need for public regulation is now recognized, though conservation leaders are not in agreement on the question of federal versus state control, Chief Forester Watts expressed the belief that regulation by state action unsupported by strong federal legislation cannot be effective. "Furthermore," he said, "I do not believe that financial aid to the states to meet the costs of regulation will induce reluctant or strongly independent states to enact appropriate regulatory legislation. Nor will it give adequate assurance that practices will be set at a satisfactory level. In order that nationwide regulation of cutting practices may come promptly and be reasonably uniform in standards and enforcement, federal regulation is needed which will as a minimum give the Secretary of Agriculture authority to set standards for required forest practices; to pass on the practices adopted by the states; to inspect enforcement; and to take direct action where suitable state legislation is not enacted and where enforcement or standards established are not acceptable."

Although admitting that he has witnessed many examples of good forest management by forest owners in almost every section of the country, Mr. Watts gave emphasis to his observation that destructive cutting practices still predominate.

"There is nothing to be gained" he said, "by dodging the fact that, except in localities where virgin timber still dominates, we cannot continue indefinitely to cut more than we grow without impairing future forest productivity. But our land has the capacity and we should have the determination to meet the challenge. For if we take steps to improve and build up the productive growing stock by nation-wide application of good forest practices, the annual growth can be increased to a level which will supply our people and industries with ample timber for all foreseeable needs at reasonable cost, and a margin will be left for export or for emergency use."

Looking to the future, Mr. Watts said, there is good reason to believe that postwar needs for lumber and other products will, in the aggregate, continue at or near wartime level. Declining needs for war purposes will be offset by pentup demands for housing, wider applications of new techniques of pulp and paper products and other developments. If the forests are to make their optimum contribution, he pointed out, it will be necessary to provide for better care and management than they have hitherto received. "An economy of abundance depends upon maintaining the productivity of natural resources at a high level, yet today, after decades of effort, the bulk of cutting on private forest lands is not under any plans for perpetuating the productivity of the resource, and a third of the private forest area, including a large part of the best timber-growing land in the South, is still without organized fire protection."

Mr. Watts criticized the "well-financed publicity campaign sponsored by the forest industries" as tending to "cultivate public complacency when the situation with respect to our forest resources is so unsatisfactory." It creates, he declared, "the impression that little not already being done on private land is needed to assure the nation ample timber supplies for the future; it exaggerates the extent and adequacy of industry progress in good forest practice.

"Since a forthright facing of the facts would not be inconsistent with the alleged objectives of the industry, namely to perpetuate the supply of forest products through sound forest management and to promote understanding of forest ownership and enterprise, I cannot escape the conclusion that the real object of this campaign is to ward off public regulation which was recommended in one form by the Department of Agriculture in 1940, brought before Congress in several forms since then and proposed for legislation in fourteen states during the past winter."

Compton Replies

Shortly after the Chief Forester's address, Wilson Compton, secretary and manager of the National Lumber Manufacturers Association, issued a statement opposing federal regulation and intimating that the Forest Service was minimizing the efforts of the forest industries to perpetuate forest resources. While admitting that much remains to be done to put American forests in the condition that they should be, he declared the industry's progress in adopting forest measures was greater than the Chief Forester represented.

He quoted Forest Service statistics published in 1938 showing that eighty-three percent of the approximately 341,000,000 acres of commercial forest land in the country were in "productive condition." These figures he compared with those recently collected by the National Lumber Manufacturers Association on 346,000,000 acres of privately owned land in thirty-six states, which revealed eighty-nine percent in productive condition. Of this total, he said, sixty percent were in productive growth, twenty-one percent were under continuous forest production, and eight percent were under intensive forest management.

He stated his belief that a program of federal regulation would tend to nationalize all forest resources, and bring about a gradual substitution of public ownership for private ownership, thus retarding private enterprise in forest industry.

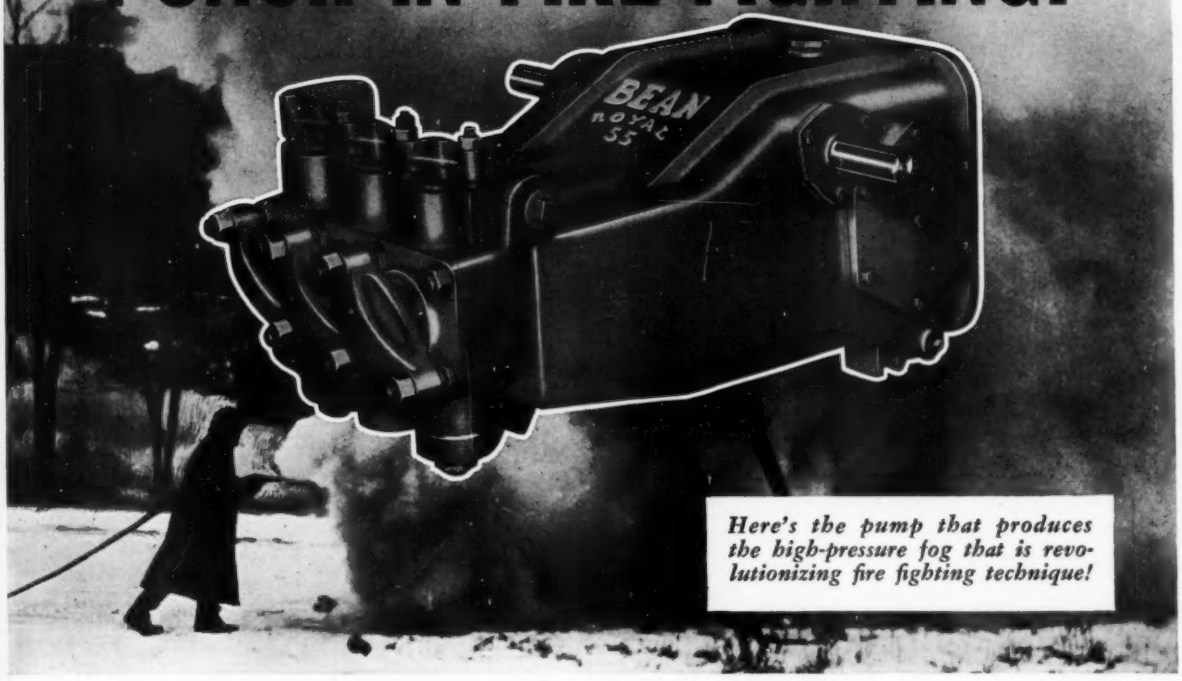
Industry's Solution

"It is, of course, entirely possible by law to require certain practices in timber cutting and in forest land management," he said. "But it is, I think, much preferable that these desirable objectives be achieved through the combined processes of education, economic inducement, and public and private cooperation. Progress in forest conservation accomplished in that way is more likely to be dependable and permanent, and certainly much more compatible with our American way of getting things done.

"On the other hand, no country has ever solved its forest land problems without some measure of public regulation. I do not think that this country will either. My own view is that certain simple restrictions on timber cutting and certain simple requirements in forest land management are both necessary and desirable; that these should be based on the tested experience of forest landowners in each region; that they should be locally administered under state law; and that state forestry commissions competent to administer such state forest practice codes should be built up and maintained in each state."

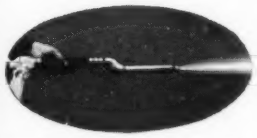
Commenting on the Chief Forester's criticism of the industry's recent publicity campaign, Dr. Compton had this to say: "I suppose that criticism is inevitable. The Forest Service for half a century has had a gloomy approach to the whole forest conservation problem. By this time this attitude is traditional, impregnable and perhaps almost unprofessional. It is the logical approach to a program of intended domination of a great industry by a federal bureau."

THE PUMP THAT PUTS A NEW PUNCH IN FIRE FIGHTING!

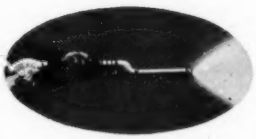


Here's the pump that produces the high-pressure fog that is revolutionizing fire fighting technique!

Delivers 600 lb. Pressure Fog at the Nozzle!

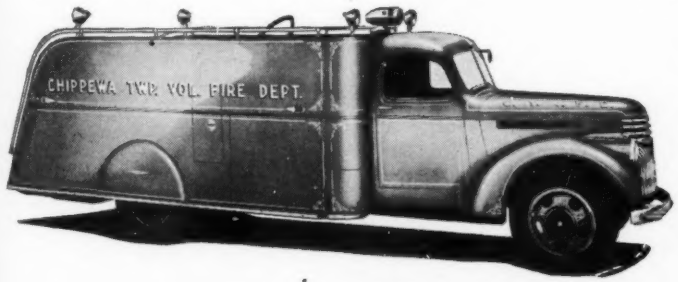


Efficient for use with 600 lb. or more nozzle pressure only.



ONE MAN *handles Fog Fire Gun and hose. Stream can be adjusted with one hand.*

FOG FIRE GUN *graduates from straight "power" stream to close-up fog.*



This 3 cylinder, all enclosed, oil bath, plunger type pump is the "heart" of the FMC Fog Fire Fighter. And what a fighting heart it is! Pumps 60 gallons of water a minute; built for much higher pressures it easily gives 600 lb. nozzle pressure (800 lbs. at pump) without overworking. Breaks up water so fine that one gallon properly used has the fire quenching possibilities of 35 low-pressure gallons. Makes fog that puts out fires faster with no water damage and no water shortage.

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New York Names White Conservation Chief

John A. White, of Bath, New York, was appointed conservation commissioner of New York State by Governor Thomas E. Dewey on September 30. He succeeds John L. Halpin who had served as acting commissioner since early in the year following the resignation of Lithgow Osborne, now in war work with the Office of Strategic Services.

Actively connected with conservation for a number of years, Mr. White since 1942 has been president of the New York State Conservation Council. One

John A. White

of the main activities of this Council consists in recommending conservation legislation to the State Legislature and to the State Conservation Department. The Council also cooperates closely with the Fish and Wildlife Service of the United States Department of the Interior. From 1939 to April of this year he was a member of the Advisory Council of the State Conservation Department. From 1939 to 1941 he served as president of the Steuben County Federation of Conservation Clubs, and before that as vice-president.

The son of an early associate of Glenn Curtiss in the Curtiss Airplane Company, Mr. White is a native New Yorker. He was born near Hammondsport in 1901, later moving to Long Island and then to Buffalo, where he attended Buffalo Technical High School. In 1919 he settled down in Bath where today, in private life, he is president of a hardware company.

Eight Service Men Die in California Fire

Eight service men, seven marines and one soldier, lost their lives in a forest fire which swept the Barrett Lake watershed in the Cleveland National Forest, California, early in October. Seventy-two others, mostly marines, were injured. The fire, flaring up on October 2 along Hauser Creek between Barrett and Morena reservoirs, about sixty miles east of San Diego, in four days burned over 15,000 acres of chaparral covered slopes. Damage to the forest was nominal, but as a human tragedy it was perhaps the greatest in national forest fire history of California.

Official announcement as to the cause of the fire and the pertinent facts leading to the tragedy was withheld at the time of going to press pending the outcome of separate investigations by the Navy, Army and U. S. Forest Service.

Initial reports indicate that a sudden and erratic shifting of wind trapped the eighty service men in a ravine where they were constructing a line preliminary to back-firing. These men, forming one of two crews dispatched to the scene, were trained in fighting forest fires and were under competent leadership, it was stated. At the time the wind shifted a small ridge separated them from the blaze, but so sudden and violent was its action that all means of escape were quickly cut off. The men were then ordered to seek protection among boulders and pockets in the dry bed of the ravine. Those who obeyed this order survived the flame.

AFA Board Acts on Conservation Issues

The Board of Directors of The American Forestry Association, meeting in Washington on September 20, took action by resolution on the following important conservation issues: The Wallgren Bill for federal regulation of private forest lands and other forest conservation matters; the Jackson Hole National Monument controversy; the question as to whether it is necessary to cut timber on national parks to meet war needs, with specific reference to spruce in the Olympic National Park; and the Quetico-Superior wilderness area of Minnesota. Resolutions passed by the Board were as follows:

Wallgren Bill—*Title I, Public Regulation of Private Forest Lands.* That the Association oppose the provisions of this title as in conflict with the position which it has consistently taken with respect to public control, and that in lieu thereof it endorses both state and federal action along the lines recommended in its 1943 Wartime Program adopted November 19, 1942.

Title II, Clarke-McNary Amendments. That the Association endorse (1) the proposals to authorize the expenditure of such sums as may be necessary for cooperative fire control and to increase from $100,000 to $2,500,000 the authorization for cooperation with states in advising farm owners on the management of their forest properties; (2) that it endorse the proposal to authorize federal participation in the control of insects and diseases provided this is done under the principles of the Clarke-McNary Act; and (3) that it oppose the proposals to substitute the present provisions in the Clarke-McNary Act requiring states to match federal expenditures by a provision authorizing the Secretary of Agriculture to require such contributions in form of services, materials, or otherwise.

Title III, Forest Management and Utilization Extension. That the Association endorse the proposal to broaden present cooperation with forest owners in the management of privately owned non-farm lands.

Title IV, Forest Cooperatives. That the Association endorse the proposal to strengthen federal cooperation in the establishment and operation of forest cooperatives, but with the proviso that reimbursement be required for any financial assistance rendered by the government to a cooperative.

Title V, Forest Insurance. That the Association endorse in principle the proposal for the offering of forest insurance, but that it withhold any expression of opinion as to the details of the plan under which such insurance would be offered pending further study.

Title VI, Forest Survey Amendment. That the Association endorse the proposal to authorize an annual appropriation of $750,000 to complete and keep current the nationwide forest survey authorized by the McSweeney-McNary Act.

Title VIII, National Forest Planting. That the Association endorse the proposal to change the authorization for planting an national forests from $400,000 a year to "such sums as may be required."

Title IX, Financial Contributions to Local Governments. That the Association endorse in principle the proposal to base payments to local communities on the value of "acquired conservation lands," but that pending further study it withhold any expression of opinion as to the detailed provisions.

Action on Titles VII and X, concerning public forest acquisition, was with-

(*Turn to page* 555)

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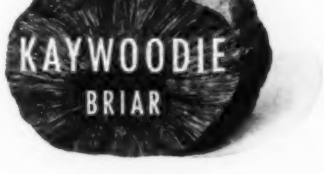


BUY WAR BONDS

TIMBER, by James Stevens. Published by Row, Peterson & Company, Evanston, Illinois. 72 pages, illustrated. Price $1.50.

This romantic and adventurous story of lumber and lumbermen, illustrated with numerous photographs which enhance the robust aspect of life in the lumber camps, serves to awaken the reader's interest in careers in forestry and the timber industry. Many angles of various opportunities in these fields are shown, mostly of the rugged work of the men in the forests.

THE GARMENT OF GOD, by Dr. John C. Merriam. Published by Charles Scribner's Sons, New York, N. Y. 162 pages. Price $2.00.

This study, written by the President Emeritus of the Carnegie Institution of Washington and subtitled "Influence of Nature in Human Experience," leads us into a deeper consideration of nature in its religious, philosophical, and scientific aspects. It emphasizes the benefits which appreciation of nature imparts to mankind and points out the inspirational influences of certain natural features, including Crater Lake, the Grand Canyon, the redwoods of California, and others. The relationship of nature to human life is its theme. The writer says that our national parks may be of real importance in making nature a part of our everyday life. To the thoughtful reader this book will provide inspiration and a new sense of the beauty and companionship of nature.

AXE MANUAL OF PETER MCLAREN, by Peter McLaren. Published by Fayette R. Plumb, Inc., Philadelphia. 84 pages, illustrated. Price, 25 cents.

A valuable handbook by America's champion wood chopper. Chapters are devoted to how to sharpen and care for an axe; how to use it, including the various types of cuts; felling a tree; how to conduct chopping contests; the boy and his axe; and the axe in sports. The making of the modern axe is also explained.

TWO THOUSAND MILES UP THE AMAZON, by Frances Norene Ahl. Published by the Christopher Publishing House, Boston, Massachusetts. 235 pages, illustrated. Price, $2.00.

A North American woman tells the story of her journey by air into the hinterland of Brazil, giving intimate glimpses of the life and culture of the Amazon country from Belem to Rio Branco. Details in regard to the production of rubber and Brazil's potentialities in this field are set forth, as well as many other interesting facts about economic and social conditions. The writer's enthusiasm for traveling in primitive, exotic places and her ability to enliven the narration with tales of human interest make this book an excellent selection for the lover of adventure and travel. A glossary of Brazilian words used and an index are included.

NUT GROWERS HANDBOOK, by Carroll D. Bush. Orange Judd Publishing Company, New York. 189 pages, illustrated. Price $1.75.

In view of the ever-increasing interest in the development and growing of native nut trees, this book fills a timely need. The author draws upon his personal experiences in nut tree culture. He deals with all the important nuts that can be grown in America, discussing their values and uses for food, as well as the value of different nut trees for lumber and ornamental uses.

Separate chapters give detailed information on planning, planting and pruning the nut orchard; on the grafting of nut trees; on polishing, drying, storing and marketing the nuts. Additional chapters deal specifically with the different nut trees including chestnuts, hazelnuts, walnuts, hickory nuts, etc. Printed in a readily usable and well illustrated size, the book should serve as an invaluable manual for those who wish to grow nut trees.

HOW TO KNOW THE TREES, by H. E. Jaques. Published by the author, 709 North Main Street, Mt. Pleasant, Iowa. 152 pages, illustrated. Spiral binding $1.00; cloth binding $1.80.

This illustrated key to the most common species of trees found east of the Rocky Mountains, with the exception of those growing in the extreme south, offers an excellent means for tree identification. The book is made as simple and understandable as possible.

The contents embrace chapters on tree habits and functions, tree study projects, how to use the keys, pictured key for the identification of our more common trees, pictured key to use during winter, and a list of the trees in their logical order by families.

An index and illustrated glossary complete the book.

FOREST TREE SEED OF THE NORTH TEMPORATE REGIONS WITH SPECIAL REFERENCE TO NORTH AMERICA, by Henry I. Baldwin, Chronica Botanica Company, Waltham, Mass., 1942, 240 pages, illustrated. Price, $4.75.

It is well known that "great oaks from little acorns grow," but not so well realized, at least in America, that the production, collection, testing and treatment of tree seed for reforestation purposes is a highly technical matter. Each kind of seed affords problems of its own. Without mastery of "seedology" nurserymen and foresters work in the dark, and many dollars fail to be converted to board feet.

Much has been written on various aspects of tree seed but it is scattered through many publications and several languages and mostly inaccessible to practitioners. Dr. Baldwin has summarized and organized all this information and made it accessible to American foresters. It is the first book on the subject in English, a valuable contribution by an American forester-scientist now doing his bit in the armed services.

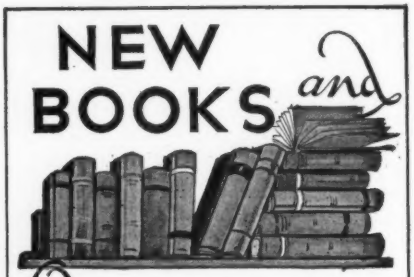
MEETING THE MAMMALS, by Victor H. Cahalane with drawings by Walter A. Weber. The Macmillan Company, New York, 1943. 133 pages, illustrated. Price, $1.75.

This short guide to the more common mammals, large and small, found in the national parks of the West, is the work of a naturalist and an artist, one now, the other formerly, connected with the National Park Service. It is both agreeably written and interestingly illustrated with pen and ink drawings. A reference list of more serious works on mammalogy adds to its value for those wishing something more than how to tell an elk from a deer.

BYWAYS TO ADVENTURE, by Edwin Way Teale. Published by Dodd, Mead and Company, New York, N. Y., illustrated. 222 pages. Price, $2.75.

Byways to Adventure will open up a new avenue of interest to those who have longed to get the greatest enjoyment from the wonderland of plants and trees and to know something of the habits of birds, animals, insects and reptiles. In fifteen chapters, Mr. Teale, a profes-

NEW BOOKS and OTHER PUBLICATIONS



A list of Selected Books on Forestry and related fields of Conservation is available to members of The American Forestry Association on request.

sional naturalist, offers a guide to nature hobbies, describes their attraction and gives detailed practical advice on equipment, methods of procedure and other pertinent information leading to appreciation of natural things.

The publications listed below must be ordered direct from the addresses as given and not through the Association.

Forest Plantations of Wisconsin, by William W. Morris. Bull. 232, Wis. Dept. of Agr., Madison, Wis.

The Status of Beavers in California, by Donald T. Tappe. Game Bull. No. 3, Div. of Fish and Game, Calif. Dept. of Nat. Resources, Sacramento, Calif.

Forest Resources of the Ponderosa Pine Region. Misc. Pub. No. 490, For. Serv., U.S.D.A., Supt. of Docs., Wash., D. C. Price 40 cents.

Cooking, Carrying, Camping on the Appalachian Trail—A Manual for Beginners. 2nd edition, by Sterling W. Edwards. Box 37, Forest Glen, Maryland. Price 25 cents.

Recreation in New Hampshire. New Hampshire State Planning and Development Commission, Concord, N. H. Price $1.00.

Growth of Ponderosa Pine by Keen Tree Class, by Philip A. Briegleb. Forest Research Note 32, Pac. N. W. For. Expt. Sta., Portland, Ore.

Home Floriculture in California, by H. M. Butterfield. Circ. 53 (revised), Calif. Agr. Exten. Serv., Univ. of Calif., Berkeley, Calif.

Stumpage and Log Prices for the Calendar Year 1941, compiled by Henry B. Steer. For. Serv., U.S.D.A., Supt. of Docs., Wash., D. C. Price 15 cents.

The Forest Situation in the Coastal Plain of Virginia, by J. W. Cruikshank. For. Survey Release No. 12. App. For. Expt. Sta., Asheville, N. C.

The County Forests of Wisconsin. Wisconsin Conservation Dept., Madison, Wis.

Snow Surveys and Irrigation Water Forecasts for Columbia Basin. Soil Cons. Serv., U. S. D. A. (Idaho Office) P. O. Box 835, Boise, Idaho.

Douglas Fir Plywood. A recorded voluntary standard of the trade. Bureau of Standards, Dept. of Commerce. Supt. of Docs., Wash., D. C. Price 10 cents.

Guide to the Appalachian Trail in the Southern Appalachians. Second edition, 1942. The Appalachian Trail Conference, Inc., 808 Seventeenth St., N. W., Wash., D. C. Price $1.75.

Common Forest Trees of Florida, by W. R. Mattoon. Third, revised, edition. Florida Board of Forestry and Parks, Tallahassee, Fla.

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CONSERVATION IN CONGRESS

AFTER a field investigation in the West during the summer, the Lumber Subcommittee of the Small Business Committee of the House held hearings on October 11 and 12, under Acting Chairman Kefauver of Tennessee, and brought out from Forest Service, War Production Board and Army officials that lumber production for the current year will probably fall below war and civilian requirement by a considerable margin.

Present estimates of 1943 production indicate that it will not exceed 33,000,000,000 board feet, or 6,000,000,000 feet under present rate of consumption, and almost 2,000,000,000 feet under 1942 production. The difference, it is believed, can be made up by utilizing stocks on hand. These, however, will be exhausted by July, 1944.

In his testimony, T. Philip Boyd, director of the WPB's Lumber Products Division, summed the matter up thus: "Prospects ahead are for a much tighter lumber situation but not necessarily a hopeless one." As to aircraft spruce, he stated that the WPB had withdrawn its request for immediate logging in the Olympic National Park of Washington. C. L. Forsling, assistant chief of the Forest Service, also testified that the Sitka spruce picture is improving. A total of 8,000,000 feet of spruce a month is now being cut in Alaska, he said, 5,000,000 of which is suitable for airplane stock. Transportation is the bottleneck, owing to a shortage of ships.

According to both Forest Service and WPB testimony, the joint Lumber War Production Project, which is just getting under way, promises to be helpful in increasing production.

The main objective of the hearing was to produce concrete suggestions for production increase, particularly in the South. The chief bottleneck is lack of labor. Prospects for using large numbers of war prisoners seem slight. Suggestions for a different organization of Army purchasing methods, higher wages for woods workers, higher ceiling prices on lumber and greater use of small mills were made for increasing production.

There was an air of compromise at the joint hearing before the Senate and House Public Lands Committees held in Jackson, Wyoming, in August. As a result of informal offers to reconsider previously expressed views on the controversial matter of the Jackson Hole National Monument, a committee of Wyoming officials appointed by Governor Hunt met with officials of the Interior Department and the Park Service.

They had hoped to work out boundaries for a small addition to the Grand Teton National Park to replace the Jackson Hole National Monument and to agree on various points of park administration. However, it is now reported that representatives of the Governor's committee, after consulting local sentiment in Teton County, decided against any compromise. If this is what happened the next move in the deadlock will be for the House Public Lands Committee to report out Representative Barrett's Bill (H.R. 2241) to abolish the monument. Failure of Congress to pass the bill would probably result in the monument boundaries remaining as they are. Passage might result in a Presidential veto.

The Bureau of the Budget on September 15 recommended an increase of $7,500,000 to the $13,048,000 appropriated for the guayule rubber project of the Forest Service. The recommendation was referred to the House Committee on Appropriations. If passed, it will permit planting an additional area of some 40,000 acres in California to this valuable rubber-producing shrub.

CONSERVATION CALENDAR

Important Bills in Congress With Action
Sept. 14-Oct. 4, 1943

Forestry

S. 250 — McNary — To promote sustained-yield forest management. Passed Senate July 8, 1943. Referred to the House Committee on Agriculture September 17, 1943.

National Parks and Monuments

H. R. 1388—Jennings—To authorize the acceptance of donations of land for the construction of a scenic parkway to provide an appropriate view of the Great Smoky Mountains National Park from the Tennessee side of the park. Passed House September 21, 1943. Referred to the Senate Committee on Public Lands and Surveys September 24, 1943.

S. 378—Hayden—To provide for acquisition of certain lands to the Montezuma Castle National Monument in Arizona. Passed Senate June 15, 1943. Passed House October 4, 1943 with amendment limiting appropriation to $25,000.

AFA Resolutions

(*From page* 551)

held, pending further study.

The Jackson Hole National Monument—That the Association is of the opinion that the withdrawal from economic use of large areas of public lands by Presidential proclamation under the Antiquities Act of 1906 is contrary to the original intent and should not be permitted.

Wartime Timber Cutting on National Parks—The Association has always stood, and still stands, firmly against any economic use of the resources of the national parks, recognizing that the distinguishing feature of these parks is preservation in their primeval condition as contrasted with conservation through wise economic use and development, which is the basic concept of national forest management. Only when all other sources of supply have been explored and found inadequate to meet the war emergency should any of the forests in the present Olympic Park be sacrificed. If such sacrifice is necessary to win the war, the areas on which the needed timber stands should be eliminated from the park and returned to the national forest. We believe that by this method a substantial area of the primeval forest can be preserved intact, and the high standards of the national park system be maintained.

Quetico-Superior—The American Forestry Association has constantly favored the Quetico-Superior Project to protect the border lakes and connecting waterways in northern Minnesota and southern Ontario from developments which would ruin, or at least greatly impair, their great beauty and recreational value. As the finest canoe country on the continent, we believe it will make its highest contribution to the public welfare in federal and dominion ownership, so managed as to preserve its restful wilderness character, and at the same time contribute important forest products from areas away from the immediate vicinity of the waterways.

The Directors of The American Forestry Association have, therefore, learned with regret that the present Minnesota authorities, by withdrawing the consent of the state to continued acquisition by the federal government of lands for rounding out the Superior National Forest, have checked completion of this worthwhile project for a national wilderness recreational area; and they desire to express the hope that this action will be rescinded, and full cooperation again given to a project of great value not only to the two countries involved, but also to the State of Minnesota.

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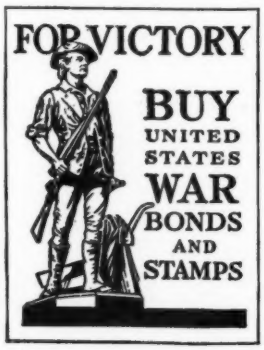

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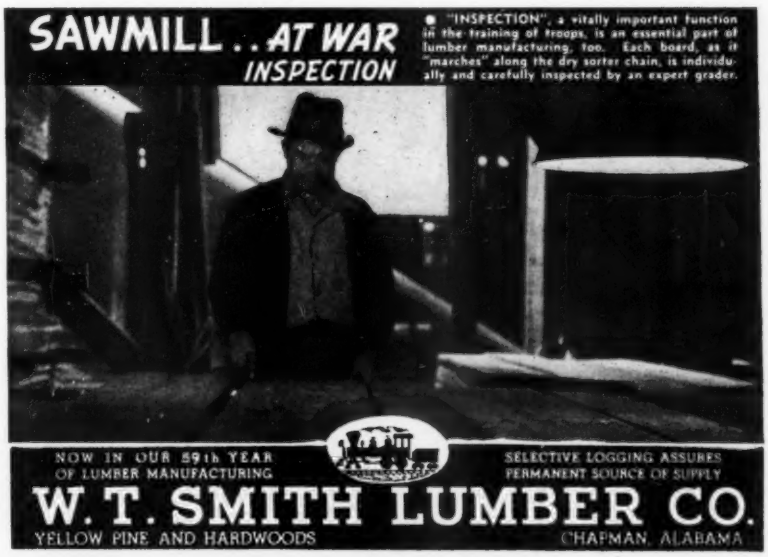
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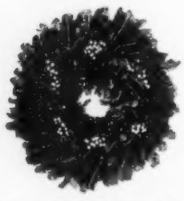

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Seed or Seedling?

(*From page* 537)

have a down-right uncanny ability to locate planted seeds and may remove nearly every nut, particularly when their natural food supply is limited.

All kinds of repellents have been tried and recommended for coating the seed or spraying over the seed spot. Nearly all of them are extremely repugnant to humans—but not to squirrels. It sometimes seems that the vile odors lead them to the nuts. One forester reports in a certain locality in Indiana where coal-tar was used as a repellent that the whiskers were singed off all the squirrels—but they got the nuts. Effective repellents may yet be found. N-butyl mercaptan, the essence of skunk and ferret odor, which creates fear in other rodents, is promising—but so far the idea of daubing the seed with something to keep rodents away is more fascinating than effective.

So far at least, mechanical devices to keep squirrels at bay seem to be the best solution. One such device is a discarded tin can. One end of the can is removed and slits at right angles are made across the other. These slits are opened up slightly and the can placed over the planting hole, the slit end flush with the ground surface over the nuts. The opening is sufficient for the shoot to grow up through. The can keeps the squirrels out. It rusts away before it affects the growth of the seedling. The standard one-quart oil can, which could, until recently at least, be picked up in quantities at filling stations is a convenient size, but smaller cans will do.

If a few nuts only are to be planted, preparing and using the cans is little trouble. For a larger plantation, their preparation involves considerable labor. The use of flower posts inserted upside down in the ground has been suggested. Bought in quantities they are not expensive and can be salvaged for use year after year with a small allowance for breakage. For larger jobs, the cheapest method may be to make an unprotected planting and then fill in blanks due to rodent depredations or rather causes in following years by use of protected plantings.

Failure to secure a good stand is often due to not using enough seed—rodents or no rodents. Even with sound seeds, careful planting and no rodent interference, the writer has observed that only about fifty percent of the seeds can be counted on to germinate and develop into seedlings, and on the average a fifty percent rodent loss can be anticipated in unprotected plantings. Thus, in such plantations, it is logical to spot-plant four or five seeds for every seedling desired. It is better to plant one or two seeds in a spot and have more spots rather than to plant four or five seeds in one spot. When a protector is used, it is wise to place two or three seeds to the can and, after three or four years remove the excess seedlings.

Living Waters for the Ages

(*From page* 546)

the others, to see that the only reason we are interested in conserving land is because we are interested in conserving human resources; that when a farmer on these slopes gets only a fourth as much grain as the farmer in the plain for the same amount of work, we have a waste of human resource.

At this junction a bright-eyed mountain boy came close to us to satisfy his curiosity. I nodded toward him and observed how sad it was to see such a child faced with an existence where he must work long, hard and reverently just for the little food he needs to maintain life. I proposed the hypothesis that China really had her Golden Age back in the years when farmers tilled more land and gave rise to more division of labor; that as the size of farms was reduced by population pressure in a purely agricultural society, division of labor decreased and brought on a decline in standards of living.

The right use of land is our key problem and its solution will go a long way in solving other problems. We need prophets who can see, understand and make known the forces at work in our midst, that we may act with intelligence toward one of the most fundamental problems of all the centuries—to work out a righteous and lasting adjustment of a people to their resources. I am moved by the ignorance of the simple elements of this relationship—and not only in the Orient, the Near East, or in North Africa. Even in America our continent is being gouged with gullies and rich soils are washed away by erosion, simply because we, too, have not yet recognized that a proper adjustment to the earth is the basis for an enduring social structure. Have we the intelligence and the will to save ourselves from decline, wastage and ruin?

As we left our graveyard discussion and made our way up the Min Gorge, we came upon an amazing scene. A throng of laborers were toiling and sliding timbers up inclines to stack in open order — great piles of yellowish white

logs. Their rythmical chants echoed from the greenish blue walls of the gorge.

Here, timber is being brought out in greater quantities than in any other place in China. The Minister of Agriculture and Forestry had asked me to make suggestions on a forest policy, so I began a series of questions which will require time to answer. Little is known of these timberlands. The government recently required timber companies to register and set a diameter limit of twelve inches, below which they shall not cut, but I noted fully ten percent of the logs were under this limit. Some foresters in China seem so intrigued by this far-away source of large timber that they overlook the bigger problem of fuel near at hand, and the conversion of nearby steep slopes, now cultivated, into timber growing land.

Leaving this colorful celebration and its interesting experiences, I returned to Chengtu, to be joined by a staff of eight highly-trained Chinese. Plans have been made for a journey to the far Northwest, to the "dust bowl" region of China and the land of the former forested mountains now ripped with gullies. But I do not expect to experience anything more stimulating than the achievement of Li Bing more than 2,000 years ago—and the benefit his works have brought to the multitudes through the centuries.

The Wizard of Sherwood

(*From page* 541)

what is absolutely necessary to maintain existing stocks of fine game birds.

Nevertheless, when the war is over, what the association has learned about quail may be applied to any type of land in the South, where the owner wishes to produce the sporting little game bird for his own pleasure. The information gathered by Herbert Stoddard is invaluable in the establishment of such preserves, regardless of their size or of the financial status of their owners.

The scientist says that the day of successful quail shooting without management is almost past. This is due, he thinks, to the increasing number of hunters, to the changing methods of agriculture in the South, to improved highways and modern methods of transportation.

Therefore, it is the belief that the work of the Quail Study Association is interwoven into the economic structure of the entire South, and involves land wherever wild and cultivated seeds will grow. That the southern sportsman and farmer will take advantage of Mr. Stoddard's very generous offer to help those who are seriously interested in raising quail under wilderness conditions, is evidenced by the increasing number of visitors who, before Pearl Harbor, followed the road to Sherwood Plantation.

Birds That Follow the Firs

(*From page* 527)

Eerily, one hears the ultimate of mystery in song, the siren strain of the varied thrush.

Lastly, another great avian ranges the domain of Douglas fir, particularly where the tree forms broad ecotones with yellow pine. I've always had the worst of luck at bird calling. Lately it required the morning-long challenging of a log cock to spur me to further trial of my "art." Beaching the outboard where fir and pine trudged down to the cottonwooded shore, I penetrated heavy timber flanking a low hill. From cupped hands my first hopeful "*Ka-ka-ka-ka-ka-kak*" seemed an unworthy echo of his wild bugling. But there followed an expectant silence. Again I gargled hollow mirth. Swiftly, like a black arrow, a dark shape slashed from the deeper green, sped along an approaching aisle, and ended with the rough clasp of clawed feet on an unseen trunk twenty paces away. Apprehensively, for I could not believe that I had worked the magic, I repeated "*Ka-ka-ka-ka-ka.*" Never then or later did the lordly pileated woodpecker answer with his own untamed laughter.

I raised the glasses to magnify the brilliance of his scarlet crest. Then he mounted the spar, swung to the hollow of its charred spike, and dropped into the long trough of his bounding flight. He was gone quickly, the festooned firs closing about their supreme secret.

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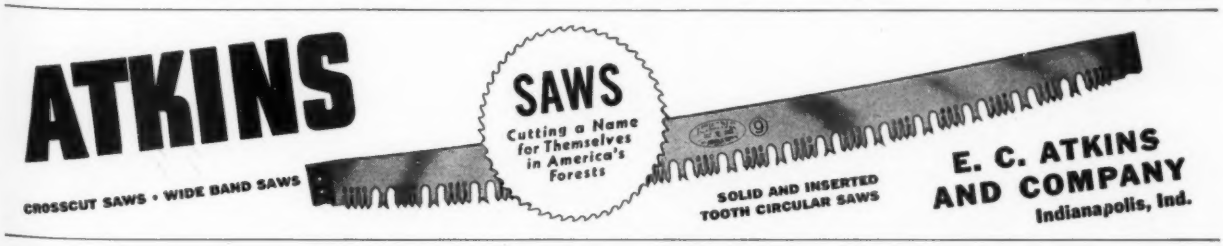
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Ducktown—A Postwar Challenge

(*From page* 523)

around 1900 when owners of damaged timber and farm crops began to complain. Since then chemists, agronomists and foresters from the University of Tennessee, the Appalachian Forest Experiment Station, the copper companies, and the TVA have studied many aspects of the soil and water problem. Residents of the villages of Copperhill, Ducktown and Isabella have planted and replanted trees, grass, shrubs and flowers. That some kinds of trees will grow under certain conditions is attested by a plantation made under the direction of State Extension Forester George Shivery in 1930. Also growing around many homesites are such trees as white poplar, lombardy poplar, maple, ailanthus, balm-of-gilead, sycamore, red cedar and holly. One white poplar, cut in the village of Copperhill in 1941, showed a diameter growth of eighteen inches in thirty-five years. To the casual observer, it might appear there is no difficulty in the way of reestablishing vegetation. Unfortunately, the plant failures probably outnumber plant successes.

Apparently erosion control and reforestation techniques which have been successful in other parts of the Tennessee Valley will be equally successful in the grass and transition zones. It is a matter of applying known methods on a vastly larger scale. The 7,000 acres of denuded land, however, is a more complicated problem. The topsoil and much of the original subsoil are gone. Rainfall averages fifty-four inches a year. Storms over the Basin produce rapid runoff from the denuded area with quick, sharp peaks. Small, normally dry gullies become raging torrents, even during moderate rains. Between storms, the soil becomes parched. The bare land is exposed twelve months of the year. Calcium, magnesium and phosphorous—all essential mineral elements for plants—are deficient. Material for mulch and simple check dams is scarce or absent, except by expensive transport. Frost action each winter is constantly reducing the size of the small grass islands.

Initial efforts in this zone will be confined to pilot tests. Many plants—grasses, legumes, weeds, trees, anything to provide a protective cover—will be tested. In addition, various methods of soil preparation will be tried. The experiences of the local residents will be summarized and evaluated in a search to find the most practical and the least expensive methods of plant restoration.

The war has curtailed the restoration job. Only 750 acres were planted before the CCC camp was evacuated in 1942, but the Tennessee Copper Company and the TVA are continuing the erosion control work on a small scale. Many lessons are being learned. The experience gained and the size of the job to be done should make this a significant postwar reconstruction project.

Answers to Tree Quiz

[Illustration is opened bud of yellowpoplar]

1. Yellowpoplar or tuliptree has been known to reach a height of 198 feet.
2. Monterey pine. In New South Wales, trees of the Sutton Forest averaged fifty feet in height and eighteen inches in diameter in thirty-five years.
3. Beech leaves. They are especially springy and do not get musty as quickly as straw.
4. Tamarack (Eastern larch).
5. A leaf scar is the corky patch developed on a twig where a leaf once grew. A bundle scar is a tiny object of pinhead size or smaller, appearing on the leaf scar; it represents the plugged end of a "sap tube" which passed from stem to leaf.
6. Yew. The fleshy red covering is edible, but the seed contains a poisonous alkaloid as do other portions of the tree.
7. Yes. You can find small one-year cones present; if lacking, there will be no seed crop the next year. Pines take two years to mature cones.
8. No—although many people think it is. Poison hemlock is a large herbaceous plant with compound leaves.
9. Yellowpoplar (see illustration).
10. Gin. The flavor is produced by distillation with juniper "berries" (really cones).

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IN this book the author has not only outlined the general principles of the common law and statutory law as applied to trees and their products, and sketched the development of the law in America, but has also collected thousands of citations of court decisions interpreting the common law, the Federal statutes, and the statutes of various American states. Many British and Canadian decisions are also cited where applicable.

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Ships of Wood and Glue

(*From page* 535)

urea, it is still within the range of available equipment for laminating one-inch lumber. A keel, stem and horn timber for a medium-sized, heavily constructed boat was so built this year. After having been fayed, it was noticed that there was slight delamination at some of the glue lines, but the small damage was probably no greater than the normal checking of solid timber.

In the meantime, laboratory tests with phenol glues have determined that an increase in temperature to 200 degrees will provide glue lines as strong as the wood—therefore adequate for the construction of marine parts, if properly applied and cured.

So far as technical knowledge is concerned, glue laminating of large timbers for marine work is practical. New laminating plants are in the offing. One, in fact, has already been started, although it is not yet in large scale production.

These plants can be built quickly. When they are available, the production of ship timbers in one piece and of any size need no longer cause the maritime services and private shipbuilders the concern which it has in the past. The available quantity of large timbers, bent frames, knees, one-piece shelves and clamps, shaft logs, horn timbers and other presently scarce members will be limited only by demand.

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Credit for photographs appearing in this issue is acknowledged as follows:

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WHO'S WHO
Among the Authors in this Issue

CLARK DARGAVEL (*Canada's Wartime Timber Problems*), a well-known Canadian magazine and newspaper writer, is author of numerous articles on various phases of Canada's war effort.

KENNETH J. SEIGWORTH (*Ducktown — A Postwar Challenge*), born and reared in the woods of western Pennsylvania, a Penn State man—class of '29, has been with the TVA since 1937.

JOHN L. BLACKFORD (*Birds That Follow the Firs*)—native of the far West, is an authority on bird life and a professional photographer. He knows and loves the great fir forests and tells here of one of their greatest lures, — the birds homing there.

W. C. LOWDERMILK (*Living Waters for the Ages*), conservationist of note and soil erosion expert, writes from China—where he went at the request of Generalissimo Chiang Kai-shek to help solve for our great ally the vital problems of flood control and food production.

CARL A. RISHELL (*Ships of Wood and Glue*) has built and played with wood boats all his life. His early interest in boats persists, though he is now an engineer on the staff of the National Lumber Manufacturers Association.

HUGH STEAVENSON (*Seed or Seedling?*) is an Iowa State College forester, class of '33. With a background of forestry and nursery experience in many states, he has been with the Soil Conservation Service in nursery production and plant testing work for eight years in Iowa, Missouri and Illinois.

CHARLES ELLIOTT (*The Wizard of Sherwood*), though one of our younger foresters, is director of the Game and Fish Commission of Georgia, with headquarters in the Capitol at Atlanta. Almost as well known as a writer as he is in his own profession, his understanding of nature and conservation problems—stemming from his wide administrative experience—makes it always profitable reading.

GRACE V. SHARRITT (*Blackout*), of Detroit, freelancer, uses her inimitable imagery in this characteristic bit of writing on a timely subject.

THE COVER—"The High Climber,—On the Way Down." Photograph by the Canadian National Film Board.

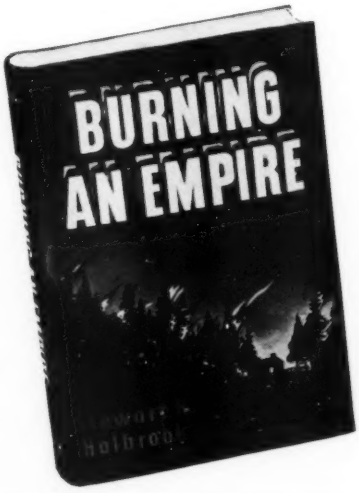
Of vital import to all foresters and others interested in our Forest Resources . . . . .

BURNING AN EMPIRE

By Stewart H. Holbrook

Foreword by COL. W. B. GREELEY
Former Chief, U. S. Forest Service

The Story of American Forest Fires



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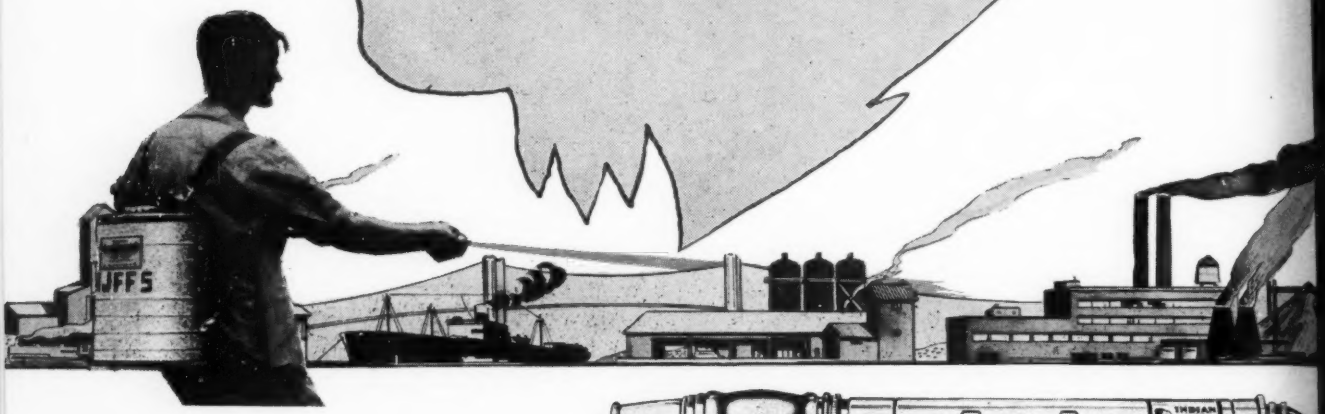

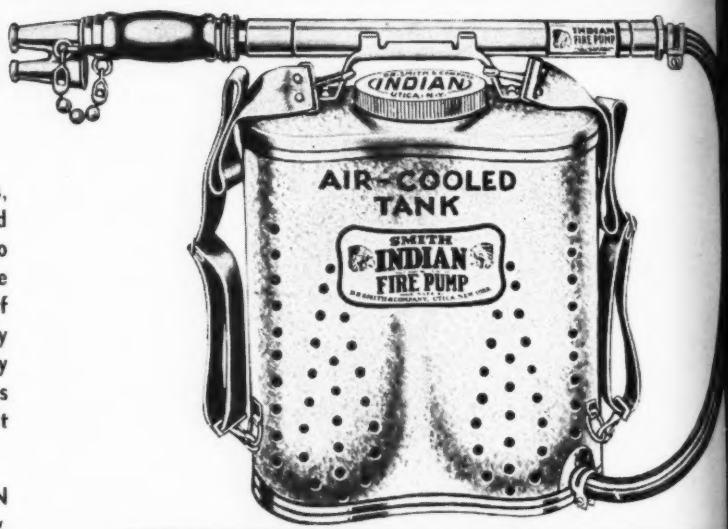

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